

MIL-L-26990B(ASG)  
18 APRIL 1967  
Superseding  
MIL-L-26990A(ASG)  
29 July 1957

MILITARY SPECIFICATION

LIGHT, MARKER, AIRPORT APPROACH, HIGH INTENSITY, TYPE MB-1

This specification has been approved by the Department of the Air Force and by the Naval Air Systems Command.

1. SCOPE

1.1 This specification covers one type of high-intensity, airport approach, marker light, designated type MB-1.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

TT-A-580 Antiseize Compound, White Lead Base, General Purpose  
(for Threaded Fittings)

Military

MIL-C-7989 Covers, Light-Transmitting, for Aeronautical Lights  
General Specification for  
MIL-E-17555 Electronic and Electrical Equipment and Associated Repair  
Parts, Preparation for Delivery of  
MIL-C-25050 Colors, Aeronautical Lights and Lighting Equipment,  
General Requirements for

STANDARDS

Federal

FED. STD. NO. 595 Colors

Military

MIL-STD-100 Engineering Drawing Practices  
MIL-STD-130 Identification Marking of US Military Property  
MIL-STD-143 Specifications and Standards, Order of Precedence for the  
Selection of

FSC 6210

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MIL-STD-810	Environmental Test Methods for Aerospace and Ground Equipment
MIL-STD-831	Test Reports, Preparation of
MS24321	Lamp, Incandescent, T-20 Bulb, Medium Bit Base
MS33586	Metals, Definition of Dissimilar

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. - The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

Federal Aviation Agency

L-823 Plugs and Receptacles, Cable Connectors

(Application for copies should be addressed to the Federal Aviation Agency, Washington, D. C. 20553.)

### \*3 REQUIREMENTS

3.1 Qualification. - The light furnished under this specification shall be a product which has been subjected to and which has passed the qualification tests specified herein, and which has been listed on or approved for listing on the applicable Qualified Products List.

\*3.2 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

### 3.3 Materials. -

3.3.1 Fungus-proof materials. - Materials that are nutrients for fungi shall not be used where it is practical to avoid them. Where used and not hermetically sealed, they shall be treated with a fungicidal agent acceptable to the procuring activity. However, if they will be used in a hermetically sealed enclosure, fungicidal treatment will not be necessary.

\*3.3.2 Metals. - Metals shall be of the corrosion-resistant type or shall be treated to resist corrosion caused by fuels, salt spray, or atmospheric conditions & a may be encountered in storage or normal service. The use of dissimilar metals as defined in MS33586 shall be avoided, whenever practicable.

3.4 Design and construction. - The light shall be so designed and constructed that no parts will work loose in service. It shall be built to withstand the strains, jars, vibrations, and other conditions incident to shipping, storage, installations and service. The light shall be so constructed that adjustments and repairs can be easily made by the personnel of operating units and overhaul bases with a minimum of training with tools normally available commercially. The light shall be so designed that weight is held to the minimum, consistent with the necessary strength and rigidity. The exact shape and design are optional, provided all requirements specified herein are met.

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3.4.1 Focus. - The entire optical system shall be of the fixed prefocus type, requiring no focusing at installation or in service.

3.5 Components. - The light shall consist of the following components:

<u>Item</u>	<u>Requirement</u>
Lens	3.5.1
Filters	3.5.3
Lamp	3.5.4
Socket	3.5.5
Housing	3.5.6
Cord	3.5.7

3.5.1 Lens. - The lens shall be of one-piece glass construction, and shall utilize both internal and external prisms. The lens shall be in accordance with figure 1, except three indexing slots need not run completely through the mounting flange as shown, but may extend up into the flange a minimum of 7/32 inch from the bottom. The lens shall be marked with an arrow and the lettering runway side, as indicated. The glass shall be aviation white, class B, heat-resistant conforming to MIL-I-7989 and MIL-C-25050.

\*3.5.2 Shield. - If the design of the lens requires shielding to limit the emitted on the runway side, a shield may be attached to the lens. The shield shall be considered a part of the lens and shall be securely fastened to the lens to insure that no adjustment or positioning of the shield is required when a lens is mounted upon an approved housing. The shield may also serve as a reflector so as to improve the light distribution.

3.5.3 Filters. - Filters shall be of class B, heat-resistant glass conforming to MIL-C-7989 and figure 2. The corners on the mounting flange of each nominal 180 degree filter shall be cut at an angle of 45 degrees so that the filters may be indexed by logs which are 3/16 inch wide by 5/32 inch radius at the top. Green filters at both room and normal operating temperatures and red filters at normal operating temperatures shall meet the chromaticity requirements of MIL-C-25050 for aviation green and red, respectively. At room temperature, red filters may have a transmission of 30.5 percent, and may be more yellow than the aviation red-yellow limit. Filters, when required, shall be shipped separately and shall be of the color specified by the procuring activity (see 6.2). Two mounting clips in accordance with figure 2 and two 3/8-inch No. 8-32 machine screws shall be supplied with each filter. Tape, or other materials that may smoke or char, shall not be applied to the filter or clips. Unless otherwise specified, each filter shall cover 180 degrees +0 -5 degrees.

\*3.5.4 Lamp. - The light shall be designed to utilize a 500W, 20-amp., medium bipost base lamp in accordance with MS24321-4, or any lamp on MS24321 which supersedes and is interchangeable with MS24321-4. Unless otherwise specified (see 6.2), the lamp shall not be furnished with the light.

3.5.5 A medium bipost socket, with a minimum rating of 500W, 20 amp. shall be securely mounted in the light. The socket shall hold the light center of the specified lamp at the specified focal point, with a maximum displacement of 1/16 inch, in any direction. All metal and nonmetal parts of the socket shall be suitable for continuous operation under the high temperature that will exist, without any smoking, charring, scaling, loss of temper, binding of parts, corrosion, or any other evidence of deterioration or failure. Metal parts shall be corrosion resistant. The socket shall be capable of

Adequate and positive contacts shall be provided for the lamp pins so that no pitting or welding will occur.

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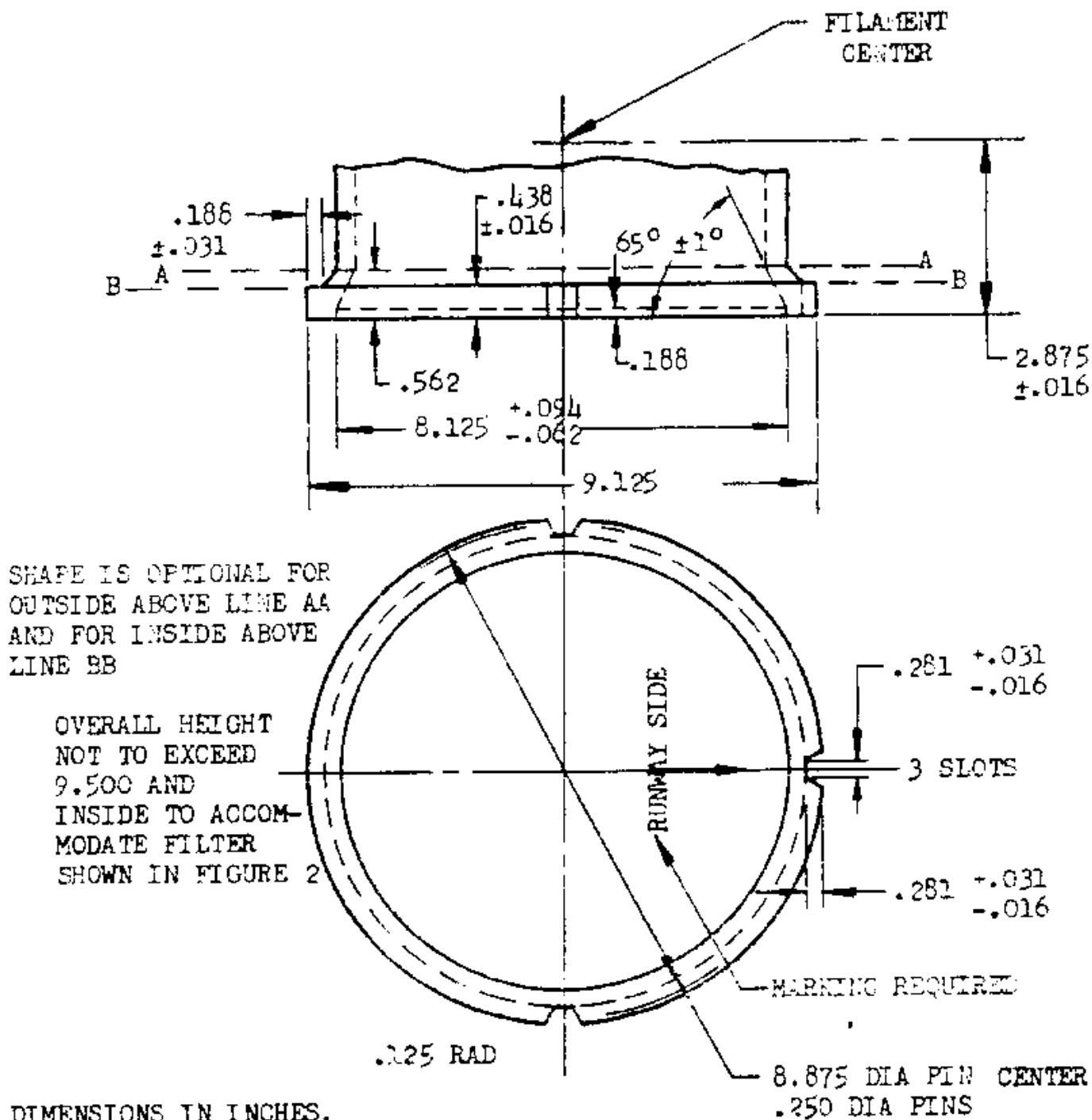


FIGURE 1. Lens

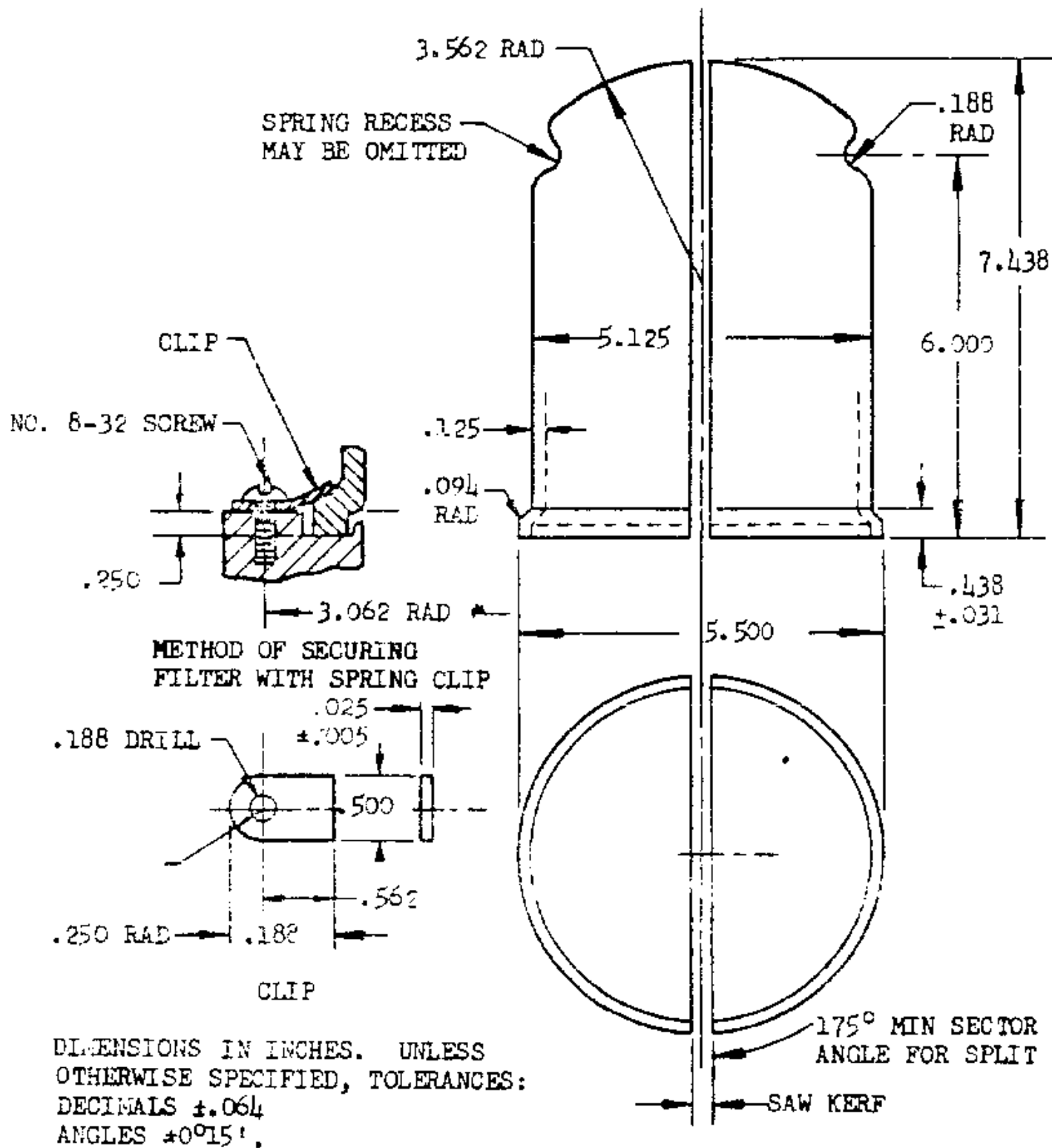


FIGURE 2. Filter

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3.5.5.1 The socket mounting bracket shall be cutaway on at least two sides so that a screwdriver blade may be used to push slack cord down into the mounting tube during installation of the light.

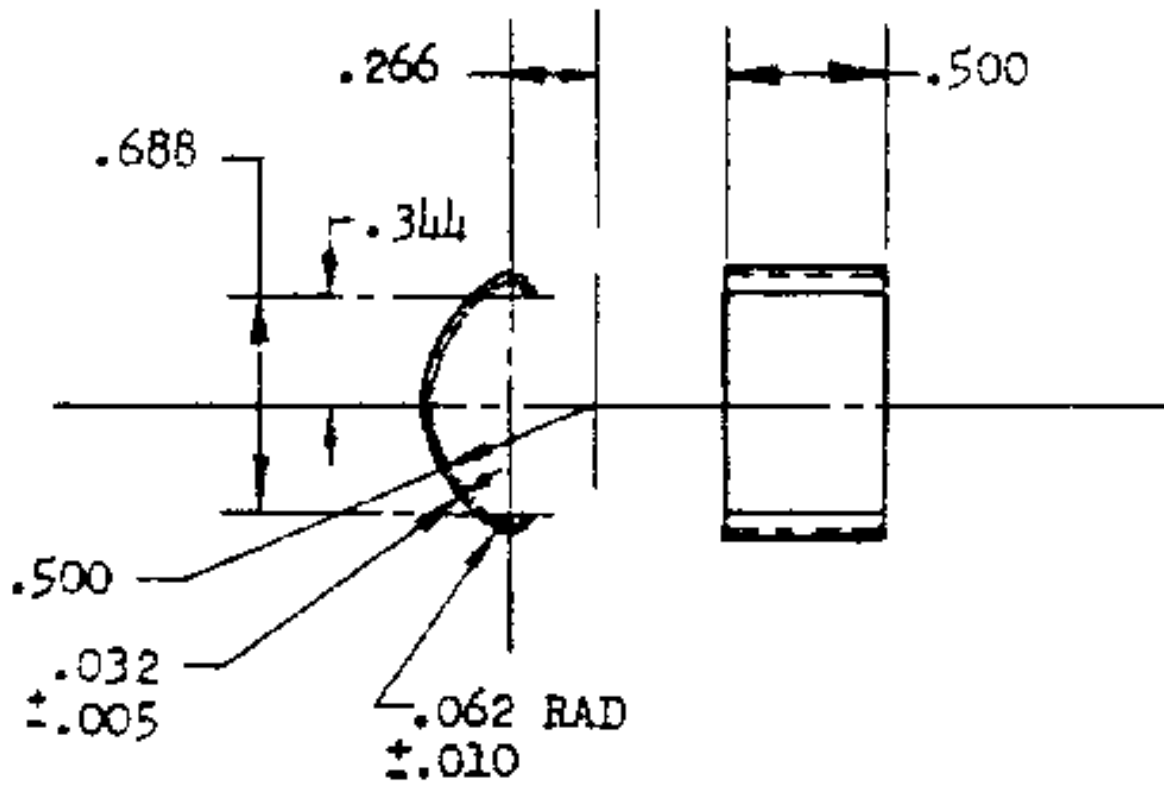
3.5.6 Housing. - The lens, filters, socket, and lamp shall be accurately and securely positioned by a lightweight aluminum housing which shall consist of two separable sections. The upper portion shall contain the lens and filters and shall be readily separable from the lower portion for relamping by loosening one wing screw. Upper and lower portions of the housing shall be properly indexed to insure aiming within the required tolerances. The lens shall be secured to the upper portion of the housing by four equally spaced spring clips in accordance with figure 3. A 1/8-inch, silicone rubber gasket shall separate the lens and housing. Filters shall be secured to the housing by spring clips as shown on figure 2. Four equally spaced holes, tapped to a depth of at least 3/8 inch for No. 8-32 screws and located in the raised surface shown thereon, shall be provided in the housing for attachment of the specified filter mounting clips and screws. The centers of the holes shall be on a circle 6-1/8 inches in diameter. The design of the housing shall be such that one nominal 180-degree filter shall be securely held in place by two clips when installed by itself. After installation, the lower surfaces of the lens and filter mounting flanges shall be approximately at the same level. Indexing lugs shall be located on the housing to engage the slots in the mounting flanges of the lens and filters and shall be of sufficient size to limit the rotation of the lens and filters to 1 degree or less. The three lugs which index the lens shall not extend up into the mounting flange slots more than 3/16 inch after the light is assembled. The two lugs which index the filters shall be along the 0-degree to 180-degree line and shall be approximately 3/16 inch wide by 5/32 inch high with a 3/32-inch radius at top.

3.5.6.1 All gaskets and other materials shall be of a type which will not emit smoke or vapor during rated-current operation within the specified temperature range. The descent of the housing shall be such that no ventilations is required, condensation upon lens and filters is minimized, and drainage is provided to prevent the gradual accumulation of condensation.

\*3.5.6.2 Mounting. - The housing shall be so designed that it may be mounted upon an unthreaded mounting tube having an external diameter of 2.375 +/- 0.035 inch. When mounted upon the tube, the tube shall extend 2-1/8 +/- 1/8 inch into the light. Two or three 1/4-20 round or fillet-head screws with rounded shall be used for clamping the housing on the tube. The threads of the screws shall be treated with antiseize compound conforming to TT-A-580.

3.5.6.3 Horizontal adjustment. - Horizontal adjustment of the light to any desired azimuth shall be obtained by rotating the housing on the mounting tube.

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MATL: ALSI TYPE 414 OR 420

DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED.  
 TOLERANCES: DECIMALS  $\pm .062$ .

FIGURE 3. Lens mounting clip



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\*3.5.6.4 Leveling adjustment. - The lower portion of the housing shall be designed to provide leveling of the light from any position not exceeding 4 degrees from the vertical. The leveling device shall be of the pivot type, adjustable from the top by four screws. The screws shall be of the round- or fillet-head type, size 10 or larger, and the threads shall be treated with antiseize compound conforming to TT-A-580.

3.5.6.5 Aiming. - A means for leveling and sighting shall be provided. The device shall be of such design that the light can be aimed with sufficient accuracy that the direction of the light beams are in accordance with 3.6.1. The leveling device may be an accurately formed surface upon which a carpenter's level may be placed in two positions at right angles during installation. The sight may be any device or marks placed upon the light in such a manner as to provide accurate aiming by sighting at the next light in the row of runway lights. Removal of the lens and filters from the upper portion of the housing shall not be required during the leveling and aiming procedure.

\*3.5.7 Cord. - The cords shall utilize two single leads each having a size 12 American wire gage (AWG), stranded, nickel-clad copper conductor and a suitable, high-temperature insulation. The temperature rating of the leads shall be not less, than 343 deg. C and the maximum outside diameter shall not exceed 3/16 inch. A two-pole, 600V plug, with pins and mating surfaces in accordance with the type I plug as shown on figure 1 of L-823, shall be molded on the lower end of the cord. The plug shall be capable of meeting the applicable construction, performance, and test requirements of L-823. Since contact losses, ambient temperatures, and lack of ventilation during normal service use may result in temperatures of approximately 149 deg. C at the surface of the plug, the plug shall be molded from a suitable compound which will not deteriorate at such temperatures. The top ends of the leads shall be provided with high temperature terminals, and shall be properly secured to the socket. The length shall be such that when hanging freely, the distance between the bottom of the assembly and the face of the plug will be 7 +/- 1/2 inch.

3.6 Performance. -

3.6. Photometric. - The light distribution shall be asymmetrical with front and rear beams emitting approximately parallel to the runway. The light beams shall be visible from all points around and above the light. When the light has been properly aimed and leveled, and has operated at a rated current so that all parts have reached normal operating temperatures, the elevation and toe-in angles of the beam axis shall be within 2 percent of the specified angles, and the light distribution shall be within 2 percent of the specified angles, and the light distribution shall be as specified herein. The 90- to 279-degree horizontal line shall be parallel to the runway centerline, and the 0- to 180-degree horizontal line shall be perpendicular to the runway centerline with the 0 degree direction toward the runway side.

3.6.1.1 Clear (white) light. -

3.6.1.1.1 Design goals. - The design goal of the light shall have each main beam of rectangular cross section, with the minimum candlepower (cp) and spread at the indicated cross sections as specified in table I.

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TABLE I. Candlepower and beam spread

Candlepower (minimum)	Horizontal angle (degrees)	Vertical angles (degrees)
20,000	80 to 90 and 270 to 280	4 to 10
10,000	75 to 95 and 265 to 285	2 to 14
5,000	75 to 95 and 265 to 285	0 to 16
1,000	75 to 95 and 265 to 285	0 to 20

3.6.1.1.1.1 The maximum for the main beams shall be 50,000 cp.

3.6.1.1.1.2 The minimum for the off-runway side (95 degrees to 265 degrees horizontal) shall be 1,500 cp at 4 degrees to 10 degrees vertical, 750 cp at 2 degrees to 14 degrees vertical, and 200 cp at 0 degree to 30 degrees vertical.

3.6.1.1.1.3 The maximum for the on-runway side shall not exceed the following candlepower values for the horizontal angles indicated at angles of 0 degree to 30 degrees above the horizontal:

Candlepower (maximum)	Horizontal angle (degrees)
100	350 to 10
250	340 to 20
500	330 to 30
1,000	320 to 40
5,000	310 to 50

3.6.1.1.1.4 The minimum in all directions above the horizontal for which other minimums are not specified shall be 20 cp.

3.6.1.1.2 Minimum acceptable requirements. - The minimum acceptable requirements for the light shall be as follows.

3.6.1.1.2.1 The 10-degree by 6-degree area at 20,000 cp may be reduced to 8 degrees by 4 degrees with round corners of 2-degree radii. The 20-degree by 12-degree area at 10,000 cp may be reduced to 15 degrees by 7 degrees with 3-1/2-degree radii.

3.6.1.1.2.2 The runway side maximums may be increased to the following candlepower values at the horizontal angle indicated:

Horizontal angle (degrees)	Candlepower (minimum)
340 to 20	1,000
330 to 30	2,000
320 to 40	3,000
310 to 50	4,000

3.6.1.1.2.3 Occasional dips below the minimum values specified in 3.6.1.1.1.2 shall be permitted, provided the average value of any horizontal trace exceeds the applicable minimum value. The 200-cp minimum at elevations from 0 degree to 30 degrees may be reduced to 100 cp.

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3.6.1.2 Colored light. - The colored light shall be obtained by adding 180-degree nominal color filters to the white light. The design shall be such that when two filters are installed, all light emitted shall be of the specified color. The color division shall be as sharp as practicable. A 5-degree transition zone on each side of the dividing plane is permitted in which the color requirements may be relaxed. The color division shall be in a vertical plane passing through the 0-degree to 180-degree line.

\*3.6.1.2.1 The light emitted from the colored light shall conform to MIL-C-25050 for type I aviation colors. When filters are installed, the requirements for the white light shall apply, except the minimum candlepower values shall be multiplied by the factors specified below.

<u>Color</u>	<u>Factors</u>
White	1.00
Green	0.15
Red	0.13

3.6.2 Environmental. - The light shall be capable of operating satisfactorily when subjected to the following environmental conditions:

- (a) Temperatures ranging from -54 deg. to +55 deg. C
- (b) A humidity up to 100 percent with condensation
- (c) Rainfall as encountered in any locale.

\*3.7 Part numbering of interchangeable parts. - All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item shall govern the manufacturer's part numbers and changes thereto.

3.8 Dimensions. - The overall height of the light shall be not more than 14 inches.

3.9 Weight. - The weight of the light with filters installed shall not exceed 14 pounds.

\*3.10. Finishes and Protective coatings. - Unless fabricated from corrosion-resistant metal all metal parts shall be suitably protected against corrosion. The outside of the light shall be finished with aviation yellow finish color No. 13538 of Federal Standard No. 595. All paint and finishes used shall be suitable for the high-operating temperatures involved, and shall not cause parts of the light to stick together.

3.11 Identification of product. - Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130, except the serial number need not be utilized.

3.12 Workmanship. - The light, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Particular attention shall be given to neatness and thoroughness of soldering, wiring, marking of parts and assemblies, welding and brazing, painting, riveting, machine-screw assemblies, and freedom of parts from burrs and sharp edges.

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\*3.12.1 Cleaning. - The light shall be thoroughly cleaned; loose, spattered, or excess solder, metal chips, or other foreign material shall be removed, during and after final assembly.

#### 4. QUALITY ASSURANCE PROVISIONS

\*4.1 Responsibility for inspection. - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

\*4.2 Classification of inspection. - The examination and testing of the light shall be classified as follows:

- (a) Qualification inspection (4.3)
- (b) Quality conformance inspect (4.4)

4.3 Qualification inspection. - Qualification inspection shall consist of all tests specified under 4.5.

4.3.1 Inspection samples. - The inspection samples shall consist of one white light, two 180-degree red filters, and two 180-degree green filters.

\*4.3.2 Test report. - Upon completion of qualification inspection, a test report shall be prepared in accordance with MIL-STD-831 and three complete copies of the report furnished to the procuring activity.

4.4 Quality conformance inspection. - Quality conformance inspection shall consist of the following:

- (a) Individual tests
- (b) Sampling plan and test

4.4.2 Sampling plan and test. -

4.4.2.1 Lot. - A lot shall consist of lights manufactured under essentially the same conditions and submitted for inspection at substantially the same time.

4.4.2.2 Sampling plan. - One light shall be selected at random from each lot of 100 or fraction thereof on the order and subjected to the test specified in 4.5.4.

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4.4.2.2.1 Rejection and retest. - When one or more lights from a lot fail to meet the specification, acceptance of all lights in the lot shall be withheld until the extent and cause of failure are determined. After corrections have been made, all necessary tests shall be repeated.

4.4.2.2.2 Continued individual tests. - For production reasons, individual tests may be continued pending the investigation of a sampling test failure. But final acceptance of the entire lot shall not be made until it is determined that the lot meets all the requirements of this specification.

4.4.3 Defects in items already accepted. - The investigation of a test failure could indicate that defects exist in items already accepted. If so, the contractor shall fully advise the procuring activity of all defects likely to be found and methods of correcting them.

4.5 Inspection methods. -

4.5.1 Examination of product. - The light shall be inspected to determine compliance with the requirements specified herein with respect to materials, workmanship, and marking.

4.5.2 Limited operation. - The light shall be completely assembled and operated. It shall be inspected to determine proper operation.

\*4.5.3 Optical performance. - Methods and procedures for conducting the optical performance test shall be prepared and submitted to the procuring activity prior to conducting the actual test. The candlepower and direction of the main beams emitted by the light shall be determined. Insufficient candlepower or deviation of over 2 degrees, either horizontal or vertical, from the direction indicated by the aiming device, shall be cause for rejection. (See 6.2.)

4.5.4 Photometric. - Photometric tests shall be conducted to determine compliance with light distribution and color requirements of 3.6.1. All parts shall reach normal operating temperatures before any readings are taken.

\*4.5.5 Environmental. - At the discretion of the procuring activity (see 6.2), the light shall be subjected to the following tests, conducted in accordance with the applicable procedures of MIL-STD-810, to determine proper operation and lack of damage.

4.5.5.1 High temperature. - The light shall be subjected to high temperature in accordance with Method 501, Procedure I. The lamp shall be operated at its rated current for a period of 7 hours in an ambient temperature of 55 deg. +/- 2 deg. C. Abnormal bulb blackening, blistering, smoking, or other evidence of heat damage to any part shall be cause for rejection.

\*4.5.5.2 Low temperature. - The light shall be subjected to low temperature in accordance with Method 502, Procedure I for a period of 48 hours, followed immediately by operation at rated current for a period of 1 hour. The light shall then be examined. Any evidence of damage shall be cause for rejection.

4.5.5.3 Humidity. - The light shall be subjected to humidity (cycling) in accordance with Method 507, Procedure I.

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4.5.5.4 Rain. - The light shall be subjected to rain in accordance with Method 506, Procedure I except the light, with two green filters installed, shall be operated at rated voltage for 2 hours before the rain is started. The light shall be operated at its rated voltage with rain falling. Lens cracking or breaking or other evidence of damage to the light shall be cause for rejection.

4.5.6 Continuous operation. - The light, with two green filters and the specified lamp installed, shall be operated continuously for a period of 24 hours at rated current and room temperature. The light shall be mounted upon a standard tube and elbow assembly simulating actual installation. Any blistering, smoking, charring, or other evidence of heat damage to parts shall be cause for rejection.

\*4.6 Inspection of preparation for delivery. - Preservation, packaging, packing, and marking shall be inspected to determine conformance to section 5.

#### \*5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. - All items of equipment shall be preserved, packaged, and packed in accordance with MIL-E-17555 for the level of shipment specified in the contract or order (see 6.2).

5.2 Marking of shipments. - Interior packages and exterior shipping containers shall be marked in accordance with MIL-E-17555. The nomenclature shall be:

LIGHT, MARKER, AIRPORT APPROACH, HIGH INTENSITY, TYPE MB-1.

#### 6. NOTES

6.1 Intended use. - The type MB-1 light is intended for use in both permanent and advance base approach lighting installations.

\*6.2 Ordering data. - Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Whether filters are to be provided with the light and the color filters desired (see 3.5.3).
- (c) Whether lamps are to be provided (see 3.5.4).
- (d) Conditions for submitting the optical performance test methods and procedures (see 4.5.3).
- (e) Environmental tests to be performed (see 4.5.5).
- (f) Applicable levels of preservation and packaging, and packing (see 5.1 and 5.2)

6.3 Instruction sheet. - An instruction sheet should be furnished with each light. This sheet should contain a description of the lamp to be used and brief but complete instructions for installing, leveling, aiming, and installation of color filters.

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\*6.4 Qualification. - With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List, whether or not such products have been so listed by that date. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Directorate of Crew and AGE Subsystems Engineering Division, Attn: SEMTC, Wright-Patterson Air Force Base, Ohio 45433, and information pertaining to qualification of products may be obtained from that activity.

\*6.5 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:  
Navy - AS

Preparing activity:  
Air Force - 11

Reviewer activities:  
Navy - AS  
Air Force - 11, 82, 85