

Federal Aviation Agency



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| AIRPORTS |
| EFFECTIVE : |
| 3/3/64 |

SUBJECT : SPECIFICATION FOR L-845 SEMIFLUSH INSET PRISMATIC AIRPORT LIGHT

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1. PURPOSE. This circular describes the subject specification requirements for an in-runway lighting fixture. The specification is for the guidance of the public, and its use is required for project activity under the Federal-aid Airport Program.
 2. CANCELLATION. This circular replaces Federal Aviation Agency Specification L-845, "Semiflush Inset Prismatic Airport Light", dated May 1, 1962, without substantive change.
 3. SCOPE OF SPECIFICATION. The specification requirements are for a semiflush light with prismatic optics. The fixture consists of an optical system, top assembly, lampholder, connecting leads, integral lamp base, and color filters.
 4. APPLICABLE SPECIFICATIONS AND STANDARDS. The following standards and specifications, of the issue in effect on the date of application for qualification (see paragraph 11), apply to this circular. This circular shall govern in case of conflict.
 - a. Federal Standard No. 595, Colors.
 - b. Military Specifications and Standard.
 - (1) MIL-C-7989 - Covers, Light-Transmitting, for Aeronautical Lights, General Specification for.
 - (2) MIL-C-25050 (ASG) - Colors, Aeronautical Lights and Lighting Equipment, General Specification for.
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(3) MIL-W-25038 (ASG) - Wire, Electrical, High Temperature and Fire Resistant, Aircraft.

(4) MS-24502 (ASG) - Filter, Marker Light, Airport Runway, Glass.

5. SOURCE OF APPLICABLE SPECIFICATIONS AND STANDARDS.

- a. Obtain copies of the Federal standard from the Regional General Services Administration Office.
- b. Obtain copies of Military specifications and standard from the Armed Services Electro-Standards Agency, Fort Monmouth, New Jersey.

6. MATERIAL AND WORKMANSHIP. All components and materials shall be of industrial quality or better. Workmanship shall be in accordance with high-grade commercial practice.

7. TYPES. The inset lights shall be made in two types as follows:

- a. Type I - 200 watt, unidirectional, 3.5° main beam elevation angle.
- b. Type II - 200 watt, bidirectional, 2° main beam elevation angle.

8. PERFORMANCE REQUIREMENTS.

- a. The semiflush prismatic lights shall be designed to provide a light distribution not less than that shown on Figures 1 and 2 when tested with the optical system and lamp specified in paragraphs 9a and 9c.
- b. The Type I unit shall comply with the photometric requirements of Figure 1. The Type II unit shall comply with the photometric requirements of Figure 2.
- c. All current carrying parts shall be insulated for at least 600 volts and shall have a current carrying capacity of at least 20 amperes.
- d. The light shall be designed and constructed for continuous outdoor operation under all conditions including:
 - (1) Temperature. Any ambient temperature from a minimum of -45°F to a maximum of 120°F at sea level.
 - (2) Service. The light unit shall be designed and constructed to withstand normal maintenance and/or aircraft operations.

9. DETAIL REQUIREMENTS.

- a. Optical System. The optical system shall consist of one or more glass prisms which will redirect the light from the lamp into the beams which will meet the light distributions shown on Figures 1 and 2. The prisms shall be clear glass fabricated from heat-resistant glass conforming to Military Specification MIL-C-7989, Class B. The prisms shall be cemented or gasketed and securely held so that excessive stresses are not imposed on the glass during any of the specified service conditions and so that a satisfactory water seal is obtained. The external surface of the lenses or prisms, when installed, shall be smooth.
- b. Color Filter. The color filter, when required, shall be a single piece of glass in accordance with Military Standard MS-24502 (ASG). The glass shall be fabricated from heat-resistant glass conforming to Military Specification MIL-C-7989, Class B, and shall comply with the requirements for nondiffusing ware, Type I, Grade B, in accordance with Military Specification MIL-C-25050 (ASG).
- (1) When a color filter is required, the photometric values specified shall be not less than those obtained by multiplying the values shown on Figures 1 and 2 of this specification by the following:
- (a) Yellow - 0.400.
- (b) Green - 0.200.
- c. Lamp. The light unit shall be designed for operation with the following lamp:
- (1) PAR56 - 200 watt, 6.6 ampere, with CC-6 filament, slightly stippled cover, screw terminal, 300-hour life.
- d. Top Assembly. The top assembly of the fixture shall be fabricated from ferrous alloy and shall be sufficiently strong and rigid to withstand the service conditions specified in paragraph 8d(2) without damage or distortion to the light unit. The top assembly shall be constructed so that it will hold the various components of the light together. The prism cover plate and lamp assembly supports shall be designed so that they can be installed as an integral unit without affecting focus or alignment of parts. The maximum diameter of the upper portion of the top assembly shall not exceed $9\frac{1}{2}$ inches; and the diameter of the lower portion of the top assembly shall be 7.970 inches (+.000 inch, -.020 inch). The top assembly shall extend at least $\frac{1}{4}$ inch down into the base to prevent side motion when the unit is struck. The external portion of the top assembly shall consist of a smoothly sloped casting of 10° maximum in the vertical

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planes paralleling the runway and 15° maximum in all other vertical planes, with sufficient strength to protect the glass prisms and all other parts of the optical system. The cover plate for the light shall be provided with a rib, or other suitable means, in the area of the glassware to permit aircraft arrestment tailhooks to ride over the light without damaging the light or the tailhook. The overall thickness of the top assembly at its outer diameter shall be $\frac{1}{2}$ inch. When installed on the integral base recessed into the pavement, no portion of the top assembly shall project above the surface of the runway by more than $\frac{1}{2}$ inch. All recessed glassware shall be shaped so that it will not produce corners or ridges which will act as dirt traps. Recesses shall be designed so that glassware will be protected from snowplow blades or wheels of maintenance vehicles and aircraft. Means shall also be provided in the top assembly to facilitate removal of the top assembly from the base for lamp replacement and maintenance purposes. The top of the fixture shall have permanent alignment markings to assist in the alignment of the light beam for the specific job intended. When installed, all boltheads not protected from shearing action on the external surface shall be countersunk. Bolts shall be removable with a standard socket wrench. The lower portions of the light unit, including prism cover plate, lamp assembly, supports, etc., shall be fabricated of stainless steel and shall be of skeletal construction to reduce the weight of the unit. The skeletal constructed portion of the assembly, including the lens holding cover plate, shall be designed to incorporate an indexing feature for mounting and supporting the PAR56 lamp rigidly and in the proper position. This indexing feature shall provide for easy lamp removal and replacement. Provisions shall be made for mounting a color filter between the lamp and lenses by the use of spring-holding clips or other suitable means.

- (1) The orientation and securing of the top assembly to the base shall be provided for by locating bolt holes 90° apart. No adjustments are to be provided between the top assembly and the lamp base.

- e. Integral Lamp Base. The lamp base shall be furnished as an integral part of the fixture. It shall be made of suitable aluminum alloy with a maximum diameter of 9½ inches and a depth of 8 inches. The inner diameter of the base shall be 8.000 inches (+.020 inch, -.000 inch) at the top. Tapped holes shall be provided in the integral base for the bolts to secure the top assembly to the base. The tapped holes shall be provided with stainless steel inserts to prevent threads from being stripped. A cable entrance hub or fitting (not to exceed 1 inch inner diameter) shall be provided near the top of the lamp base. The base shall be designed so that the cable entrance hub will be in alignment with any one of the tapped bolt holes. Two No. 12 AWG wires for connecting lamp leads shall be

sealed at the factory into the entrance fitting with a suitable permanent sealer that will assure a waterproof seal under all the conditions specified in paragraph 8d. The base shall be provided with external ribs for reinforcement and additional heat dissipation.

- f. Leads. Two connecting leads, installed in accordance with paragraph 9e, shall be supplied to connect the lamp to the external wiring. The leads shall consist of 24-inch lengths of 600-volt minimum, No. 12 AWG, flexible wire per Military Specification MIL-W-25038 (ASG) or an approved equal. High temperature spade lugs shall be provided on the free end of the conductor for connection to the screw terminals of the PAR56 lamp.
- g. Gaskets. A suitable gasket shall be provided for installation between top housing and lamp base. The gasket utilized in the light shall be of silicone rubber and permit, without damage, a reasonable number of removals and reinstallations. No adhesives or other preparation shall be required to obtain the desired watertightness.
- h. Bolts. All bolts, nuts, and washers required for the installation of the unit shall be of 18-8 stainless steel. Bolts which are used in the top surface of the light assembly shall be hexagon-head cap screws with a minimum diameter of $\frac{1}{2}$ inch. There shall be not less than 4 bolts used to secure the top assembly to the lamp base.
- i. Finish. All surfaces of the finished assembly shall be smooth, without burrs or sharp edges, and surfaces receiving gaskets shall be flat within a tolerance of ± 0.010 inch.
- j. Protective Coating. All ferrous parts of the fixture not made of stainless steel shall be treated after fabrication for corrosion protection by electro-cadmium plating. The coating shall be free of defects that may affect the coating value.
- k. Painting. All metal surfaces exposed above the ground shall be additionally protected with one prime coat and one finish coat of paint. The prime coat shall be suitable for the metal treatment involved and the finish coat shall be high quality enamel type paint suitable for the drying process used. The color shall conform to Federal Standard No. 595, Colors, Table X, Aviation Yellow, No. 13538.
- l. Parts List and Installation Instructions. A complete parts list and installation instructions shall be furnished with each new installation. The parts list and installation instructions shall also be furnished with individual assemblies shipped for maintenance or replacement purposes. Sufficient drawings or illustrations shall be provided to indicate clearly the method of installation.

10. TESTING.

- a. Approval Testing. One sample unit of each type of lighting fixture submitted for approval shall be subjected to and checked for compliance with the electrical and physical tests described below.
- (1) Photometric Test.
 - (a) The optical performance of the unit shall be determined by performing the photometric test with the fixture and the type lamp listed in paragraph 9c. The lamp shall be operated at rated current. During the test, the fixture shall be operated from a stable voltage or current source. The curve may be shifted a maximum of 1° either side, horizontally or vertically, with reference to the applicable specification curve to determine photometric compliance.
 - (b) Horizontal light distributions for the Type I unit shall be measured at elevation angles of 0°, 2½°, 3½°, 4½°, and 7°. The fixture shall meet the requirements of Figure 1.
 - (c) Horizontal light distributions for the Type II unit shall be measured at elevation angles of 0°, 1°, 2°, 3°, and 5°. The fixture shall meet the requirements of Figure 2.
 - (2) High Temperature Test. The light shall be subjected to a high temperature of 55°C ±2°C for a period of 7 hours with the lamp operating at rated current. Any evidence of heat damage to any part shall be cause for rejection.
 - (3) Leakage Test. The light unit shall be assembled and subjected to an internal air pressure of 5 psi for a minimum of one minute while submerged in water. Any air leakage shall be cause for rejection.
 - (4) Cycling and Thermal Shock Test. The light unit shall be assembled with a green filter installed in its proper position between the lamp and lens. The fixture shall be subjected to a cycling test by operating the unit at room temperature (dry) for a period of not less than 4 hours. At the expiration of the "on" part of the cycle, the fixture shall be de-energized and immediately submerged under at least 1 foot of water. The temperature of the water before submersion shall be 5°C or lower. The unit shall remain under water for at least 4 hours. At the expiration of the "off" part of the cycle, the fixture shall be subjected to repetition of the above tests until a total of 3 "on-off" cycles have been completed. The fixture shall be immediately opened at the completion of the third

cycle and inspected. Any evidence of glass breakage, penetration of water into the lamp compartment, damage to any part of the unit, or equipment failure during the test shall be cause for rejection.

(5) Low Temperature Test. The light unit shall be subjected to a low temperature of $-55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for a period of 48 hours followed immediately by operation at rated current. Any evidence of damage shall be cause for rejection.

(6) Load Test. The final test shall be to subject the light fixture to the following static load test. The assembled fixture with the top fitting, integral lamp base, and lamp in position shall be placed on a flat steel plate mounted in a standard testing machine. This test mounting shall simulate the actual fixture installation. The load shall be applied through a block of rubber, $8\frac{1}{2}$ inches in diameter and 1 inch thick, having a Shore A hardness of 55 to 70. A total load of 100,000 pounds shall be applied uniformly over the area of the fitting at a rate of not more than 10,000 pounds per minute. The light shall be considered unsatisfactory if there is any permanent deformation, cracking of material, breaking, or damage to any part of the fixture.

b. Additional inspections and tests shall be made as deemed necessary by the Federal Aviation Agency, Airports Service, Washington, D. C. 20553, to determine compliance with this specification.

11. QUALIFICATION.

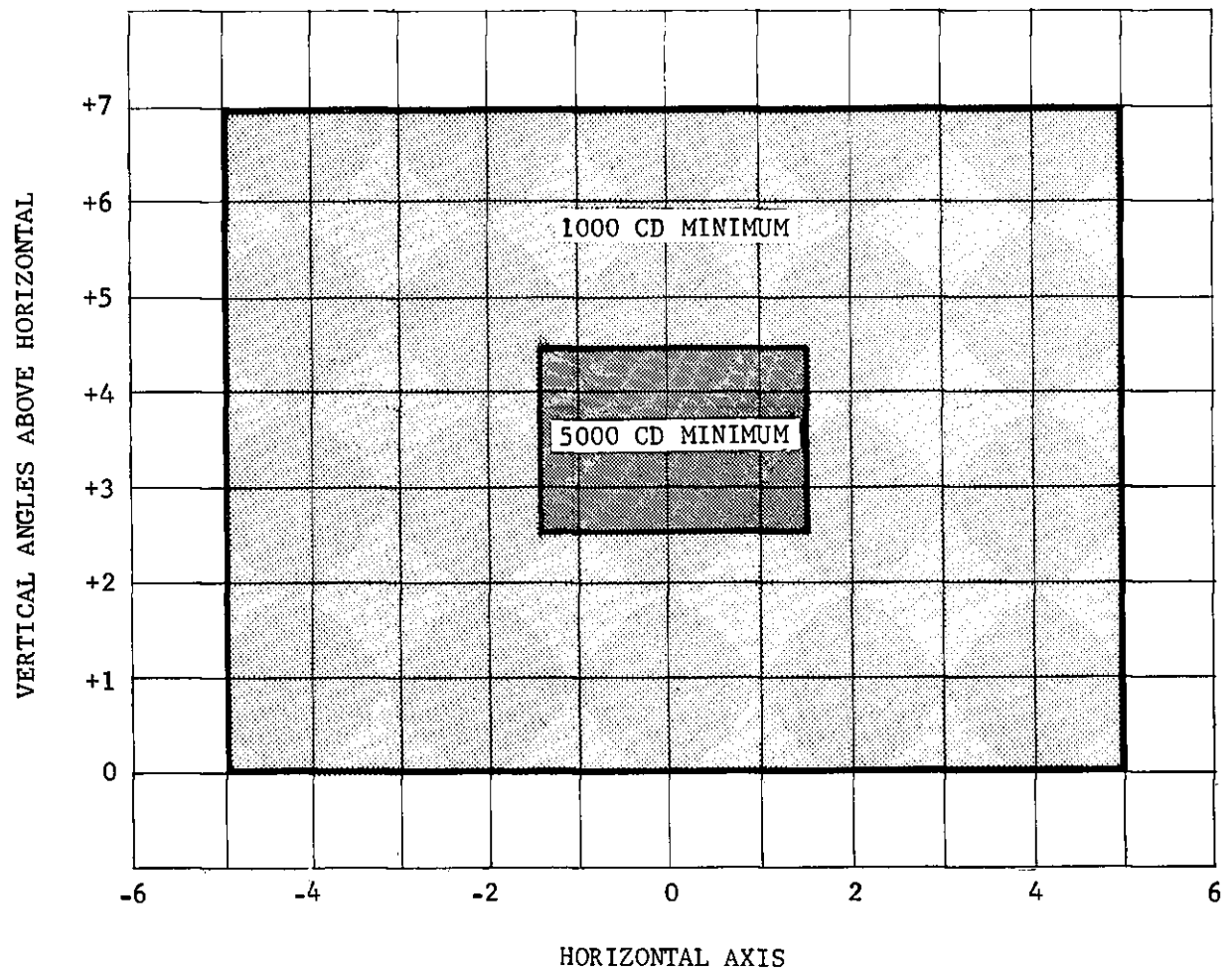
a. The manufacturer shall furnish the light fixtures to a disinterested testing laboratory to be tested as described in paragraph 10 to obtain certification regarding the ability to manufacture equipment meeting the requirements of this specification. The disinterested testing laboratory shall be a laboratory acceptable to the Federal Aviation Agency, Airports Service, Washington, D. C. 20553. The manufacturer shall furnish two copies of the testing laboratory's reports to the Airports Service for review and approval consideration. Upon approval of test reports which show satisfactory certification of compliance, the Airports Service will list the name of the qualified manufacturer and a description of their equipment in Advisory Circular No. 150/5345-1, "Approved Airport Lighting Equipment." The cost of the testing shall be borne by the manufacturer offering the material for qualification.

b. The manufacturer shall provide certification from the lens manufacturer that the lens and filter meet the transmissivity, color, and ware requirements of the referenced specifications under paragraphs 9a and 9b.

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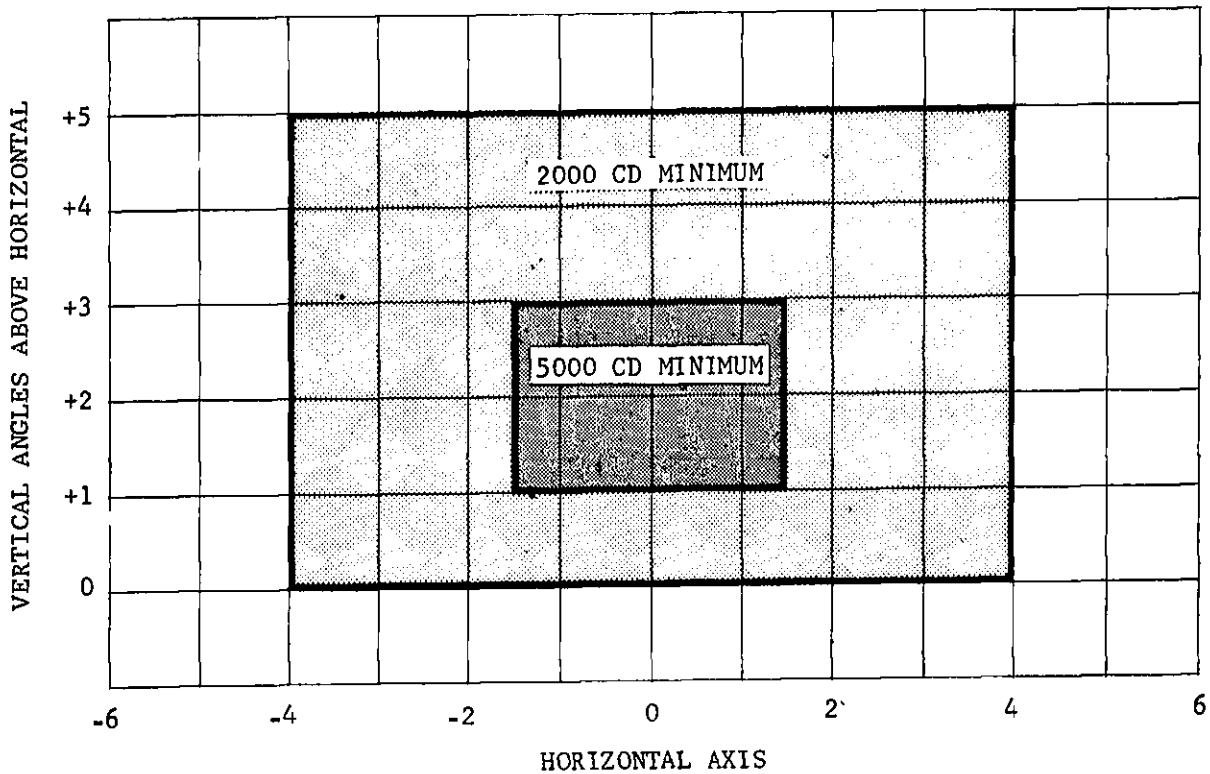
- c. Parts list and installation instructions shall be submitted to the Federal Aviation Agency, Airports Service, Washington, D. C. 20553, for review.
 - d. At any time after approval has been granted under the above conditions, a certified copy of factory test reports on the latest production run of equipment produced under this specification shall be made available by the manufacturer upon written request by the Federal Aviation Agency, Airports Service, Washington, D. C. 20553.
12. HOW TO GET THIS CIRCULAR. Obtain copies of this circular, AC 150/5345- , "Specification for L-845 Semiflush Inset Prismatic Airport Light", from the Federal Aviation Agency, Distribution Section, HQ-438, Washington, D. C. 20553.


Chester H. Bowers
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NOTE: A $\pm 1^\circ$ horizontal or vertical shift is permitted for qualification.

FIGURE 1. ISOCANDELA CURVE FOR TYPE I FIXTURE



NOTE: A $\pm 1^\circ$ horizontal or vertical shift is permitted for qualification.

FIGURE 2. ISOCANDELA CURVE FOR TYPE II FIXTURE