

Federal Aviation Agency



AC NO: AC 150/5345-19
AIRPORTS
EFFECTIVE : 5/11/64

SUBJECT : SPECIFICATION FOR L-838 SEMIFLUSH PRISMATIC AIRPORT LIGHT

1. PURPOSE. This circular describes the subject specification requirements for a semiflush prismatic airport light. 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 advisory circular cancels and replaces Federal Aviation Agency Specification L-838, "Semiflush Prismatic Airport Light", dated November 1, 1960, and Amendment No. 1, dated May 17, 1961. The substantive changes made in this advisory circular are the deletion of Type III, unidirectional, 300-watt, 1/2-inch high fixture with all detailed text; and the addition of a new Type III, unidirectional, 200-watt, and a Type IV, bidirectional, 200-watt, 1/2-inch high fixture with detailed text.
3. SCOPE OF SPECIFICATION. The specification requirements presented are for a semiflush prismatic airport light with prismatic optics for use on operational areas where elevated lights would constitute a hazard. The unit consists essentially of an optical system, housing, lampholder, connecting leads, connectors, and color filters as specified.
4. APPLICABLE SPECIFICATIONS, STANDARDS, AND DRAWING. The following specifications, standards, and drawing, of the issue in effect on the date of application for qualification (see paragraph 10), apply to this circular. This circular shall govern in case of conflict.
 - a. Federal Specifications and Standard.
 - (1) QQ-Z-325 - Zinc Coating, Electrodeposited, Requirements for.
 - (2) QQ-P-416 - Plating, Cadmium (Electrodeposited).
 - (3) Federal Standard No. 595 - Colors.

b. Military Specifications and Standard.

- (1) MIL-C-25050 - Colors, Aeronautical Lights and Lighting Equipment, General Specification for.
- (2) MIL-C-7989 - Covers, Light Transmitting, for Aeronautical Lights, General Specification for.
- (3) MS-24502 - Filter, Marker Light, Airport Runway, Glass.

c. FAA Specifications and Drawing.

- (1) Specification for L-809 Airport Light Base and Transformer Housing (AC 150/5345-6).
- (2) L-823 - Plug and Receptacle, Cable Connectors.
- (3) L-834 - Individual Lamp Series-to-Series Type Insulating Transformer for 5000 Volt Series Circuit.
- (4) L-837 - Large-Size Light Base and Transformer Housing.
- (5) L-839 - Individual Lamp Series-to-Series Type Insulating Transformer for 5000 Volt Series Circuit 6.6/20 Amperes 300 Watt.
- (6) FAA Drawing D-5225 - Adapter Plates for L-837 Light Bases.

5. SOURCE OF APPLICABLE SPECIFICATIONS, STANDARDS, AND DRAWING.

- a. Obtain copies of Federal specifications and standard from the Business Service Centers of the General Services Administration Regional Offices.
- b. Obtain copies of the Military specifications and standard from the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia 20, Pennsylvania, Attn: Code CDS.
- c. Obtain copies of FAA specifications and drawing from the Federal Aviation Agency, Distribution Section, HQ-438, Washington, D. C. 20553.

6. TYPES. The semiflush mounted prismatic light shall be made in four types as follows:

<u>Type</u>	<u>Beam Type</u>	<u>Toe-in Angle</u>	<u>Elevation Angle</u>	<u>Lamp Watts</u>	<u>Maximum Height Above Pavement</u>
I	Bidirectional	3.5°	4.5°	300	1 inch
II	Unidirectional	None	3.5°	200	1 inch
III	Unidirectional	None	3.5°	200	1/2 inch
IV	Bidirectional	None	2.0°	200	1/2 inch

7. PERFORMANCE REQUIREMENTS.

- a. The semiflush prismatic lights shall be designed to provide a light distribution not less than the candela values shown on Figure 1 for Type I, Figure 2 for Type II, Figure 3 for Type III, and Figure 4 for Type IV, when tested with lamps and optical systems specified in paragraphs 8a and 8c.
- b. All current carrying parts shall be insulated for at least 600 volts and have a current carrying capacity of at least 20 amperes.
- c. The unit shall be designed and constructed for continuous outdoor operation under the following conditions:
- (1) Temperature. Any ambient temperature from a minimum of -45°F to a maximum of +120°F at sea level.
 - (2) Weather. Continuous operation under all weather conditions.
 - (3) Load and Stress. The units shall withstand a static and dynamic load of 100,000 pounds.
- d. When color is specified, the candela values shall be not less than those obtained by multiplying the candela values shown on the applicable photometric curves of this specification by 0.400 for yellow and 0.200 for green.

8. DETAIL REQUIREMENTS.

- a. Optical System. The optical system shall consist of glass lenses, or prisms, which will redirect the light from the lamp into the beams which will meet the specified candela distribution requirements. The lenses, or prisms, shall be clear glass fabricated from heat-resistant glass conforming to Military Specification MIL-C-7989, Class B. The lenses, or prisms, shall be cemented or gasketed and securely held so that excessive stresses are not imposed on the glass during any of the specified load conditions and so that a water seal is obtained. The external surface of the lenses, or prisms, when installed shall be smooth.

- b. Color Filter. The color filter shall be a single piece of glass in accordance with Military Standard MS-24502. 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.
- c. Lamps. The light units shall be designed for operation with one of the following lamps:
- (1) Type I. PAR56 - 300 watts, 20 amperes, with C-6 filament, lightly stippled cover, screw terminal, 100-hour life.
 - (2) Types II, III, and IV. PAR56 - 200 watts, 6.6 amperes, with CC-6 filament, lightly stippled cover, screw terminal, 300-hour life.
- d. Housing. All metal parts of the top assembly and securing and orienting rings shall be fabricated from ferrous alloy and shall be sufficiently strong and rigid to withstand the load specified in paragraph 7c(3) without damage or distortion to the light unit.
- (1) The top assembly shall be constructed so that it will hold the various components of the light together, including the securing ring, lens cover plate, and lamp assembly supports, so that it can be installed as an integral unit without affecting focus or alignment of parts.
 - (2) The external portion of the top assembly shall consist of a smoothly sloped casting of 15° maximum in the vertical planes paralleling the runway and 20° maximum in all other vertical planes with sufficient strength to protect the lenses, or prisms, and other parts of the optical system. Means shall be provided on the external portion of the top assembly to facilitate its removal from the orienting ring for lamp replacement and maintenance purposes. Permanent alignment markings to assist in the alignment of the light beam for the specific job intended shall also be provided on the external portion of the top assembly.
 - (3) The top assembly for the Type III and Type IV lights shall be provided with a rib or other suitable means in the area of the glassware to permit arrestment tailhooks to ride over the light without causing damage to the light or the tailhook.
 - (4) The maximum diameter of the upper portion of the light unit shall not exceed 12 inches; and the diameter of the lower portion of the unit shall be 7.812 inches (+0.02 inch, -0.04 inch), and it shall extend at least 1/4 inch down into the base to prevent

side motion when the unit is struck. The overall thickness of the top assembly at its outer diameter, including securing ring and gaskets, shall be 3/4 inch.

- (5) 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 snow-plow blades or wheels of maintenance vehicles and aircraft.
 - (6) When installed on a base recessed in the pavement, no portion of the housing shall project above the surface of the runway by more than one-inch maximum for Types I and II and 1/2-inch maximum for Types III and IV. Also, when installed, all boltheads not protected from shearing action on the external surfaces shall be countersunk. All bolts shall be removable with a standard socket wrench.
 - (7) The lower portions of the light unit, including lens cover plate, lamp assembly supports, etc., shall be fabricated of stainless steel and shall be of skeletal construction in order 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 in the proper orientation. This indexing feature shall provide for easy lamp removal and replacement.
 - (8) Provisions shall be made for mounting a color filter between the lamp and lenses by means of spring-holding clips or other suitable means.
- e. Orienting and Securing Ring Assembly. The orienting and securing ring assembly shall be designed to fit an L-809 base housing and shall be constructed from suitable ferrous alloy. This ring assembly shall be designed to permit the light unit to be readily rotated through 360° when the securing ring is loosely bolted to the base housing and the orienting ring is loosely bolted to the light unit in order to provide proper orientation of the light beam. When the ring assembly is bolted securely, all portions of the light shall be held firmly so that they do not shift or rotate. A watertight seal shall be obtained between the light unit, orienting and securing ring, and the base housing when assembled with gaskets.
- f. Leads. A cable-connecting lead assembly shall be supplied to connect the lamp and the receptacle of the secondary of the isolating transformer. The lead shall consist of a 16-inch length of 2-conductor, 600-volt minimum, No. 12 AWG standard cord conforming to the provisions of the Underwriters' Laboratories, Incorporated, requirements for Type SO cord. This lead shall terminate in a molded plug

conforming to Figure 1a of FAA Specification L-823. The first 6 inches of the outer jacket shall be removed from the free end of the cable, and woven glass sleeving placed on each of the 2 insulated conductors. A high temperature spade lug shall be provided on the free end of each conductor for connection to the screw terminals of the PAR56 lamp.

- g. Gaskets. One gasket, 1/8-inch thick, 12 inches outside diameter, 7.9 inches inside diameter, punched for the fixture mounting bolts, shall be furnished with each light unit for installation between securing ring and base flange. Additional gaskets, if required, shall be furnished for all mating surfaces of the top assembly to assure watertightness. These additional gaskets shall be not less than 1/16-inch thick. All gaskets in the light shall be of a silicone rubber type which will not emit smoke or vapor during rated current operation within the specified temperature range and permit, without damage, a reasonable number of removals and reinstallations. No adhesives or other preparation shall be required to obtain 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 5/16 inch. There shall be not less than 6 bolts used to secure one structural part to another. Bolts, 3/8-16 NC-2, shall be furnished to secure the securing ring assembly to the base housing, and they shall extend through the base flange a minimum of three threads.
- 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 metal surfaces of the top assembly shall be treated after fabrication, if required, for corrosion protection by hot-dip galvanizing. The minimum weight of the coating, as determined by a weight test before and after galvanizing, shall be not less than 2.45 ounces per square foot. The coating shall be free of defects that may affect the coating value. Ring assembly surfaces shall be treated after fabrication, if required, for corrosion protection as specified in Federal Specification QQ-Z-325, Type I, Class 2, or QQ-P-416, Type I, Class 1.
- 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.

1. Bases. The base to be used with the Type I unit, with an adapter plate, shall conform to FAA Specification L-837. For the Type II, III, and IV units, the base shall conform to FAA Specification L-809 or FAA Specification L-837, with an adapter plate, whichever is specified. These bases are not a part of this specification. The adapter plate to be used with the L-837 base should conform to FAA Drawing D-5225.
 - m. Insulating Transformers. The insulating transformer for use with the Type I unit shall conform to FAA Specification L-839; and the insulating transformer for use with the Type II, III, and IV units shall conform to FAA Specification L-834, Type II, 200 watt. The insulating transformer is not a part of this specification.
 - n. 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.
9. 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 and with the applicable detail requirements under paragraph 8.
- a. Photometric Test.
 - (1) The optical performance of the unit shall be determined by photometric readings with a clear lens and the type lamp listed in paragraph 8c. 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.
 - (2) Horizontal light distribution for the Type I unit shall be measured at elevation angles of $1/2^\circ$, $3-1/2^\circ$, $4-1/2^\circ$, $5-1/2^\circ$, and 7° . The fixture shall meet the requirements of Figure 1.
 - (3) Horizontal light distribution for the Type II unit shall be measured at elevation angles of $-1/2^\circ$, $1-1/2^\circ$, $3-1/2^\circ$, $5-1/2^\circ$, and $7-1/2^\circ$. The fixture shall meet the requirements of Figure 2.
 - (4) Horizontal light distribution for the Type III unit shall be measured at elevation angles of 0° , $2-1/2^\circ$, $3-1/2^\circ$, $4-1/2^\circ$, and 7° . The fixture shall meet the requirements of Figure 3.

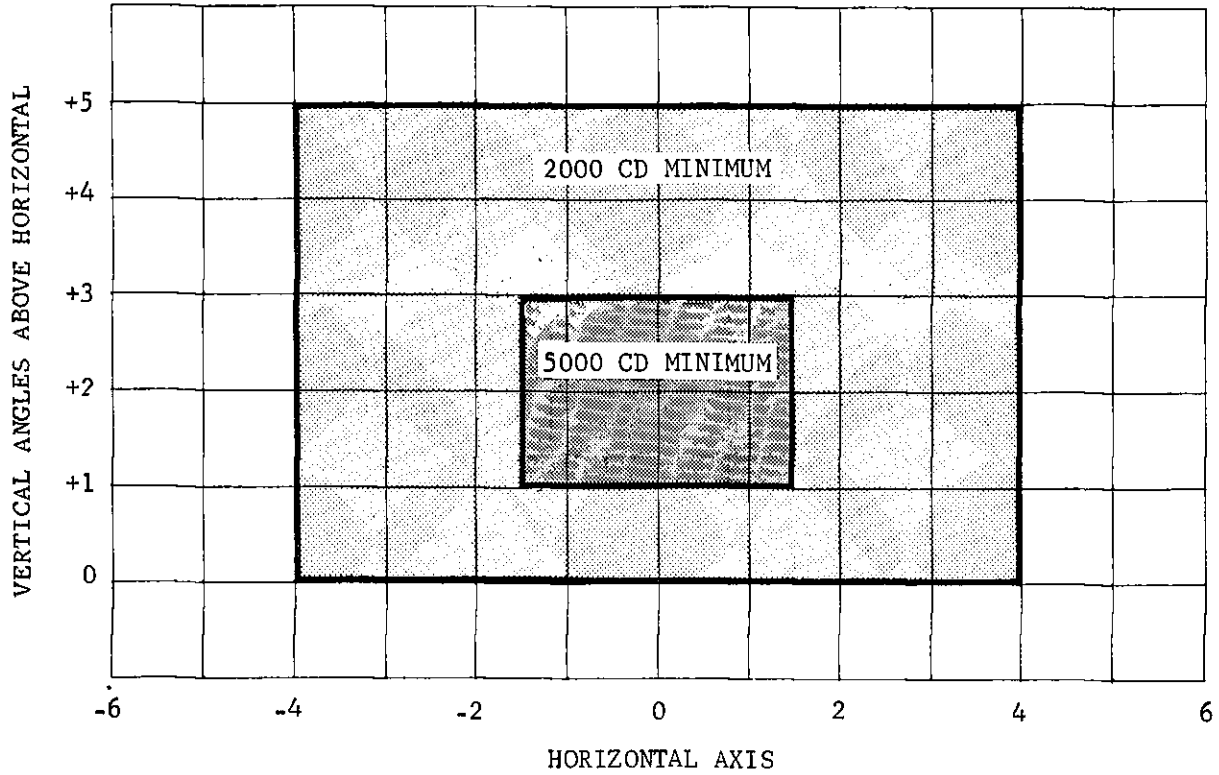
- (5) Horizontal light distribution for the Type IV unit shall be measured at elevation angles of 0° , 1° , 2° , 3° , and 5° . The fixture shall meet the requirements of Figure 4.
- b. High Temperature Test. The light shall be subjected to a high temperature of $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 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.
- c. Leakage Test. The light shall be assembled on a base 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.
- d. Cycling and Thermal Shock Test. The light shall be assembled on a base 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 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 test 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.
- e. Low Temperature Test. The light 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.
- f. Load Test. The final test shall be to subject the light fixture to the following static load test. The fixture shall be placed on a flat steel ring having essentially the same dimensions as the top flange of an L-809 base. The load shall be applied through a block of rubber, 11 inches in diameter and 1-1/2 inches thick, having a Shore A hardness of 55 to 70. A total of 100,000 pounds shall be applied uniformly over the area of the assembly at a rate not greater than 10,000 pounds per minute. The light shall be considered unsatisfactory if there is any permanent deformation, cracking of material or finish, breaking, or damage to any part of the light.
- g. 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.

10. QUALIFICATION.

- a. The manufacturer shall furnish a production sample of each type fixture listed in paragraph 6 to a disinterested testing laboratory to be tested as described in paragraph 9 to obtain certification regarding the ability to manufacture these lighting fixtures 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 the test reports which show satisfactory certification of compliance, the Airports Service will list the name of the qualified manufacturer and a description of their light fixture in Advisory Circular No. 150/5345-1, "Approved Airport Lighting Equipment". The cost of the testing shall be borne by the manufacturer offering the equipment for approval. In addition, a preproduction model shall be furnished to the Airports Service for physical inspection.
- b. Parts lists, installation instructions, and drawings shall be submitted to the Federal Aviation Agency, Airports Service, Washington, D. C. 20553, for review and approval.
- c. A certificate of compliance from the lens manufacturer that the lenses conform to the detailed requirements specified in paragraph 8 shall be submitted to the Federal Aviation Agency, Airports Service, Washington, D. C. 20553, for review and approval.
- 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 any one of the fixtures 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.

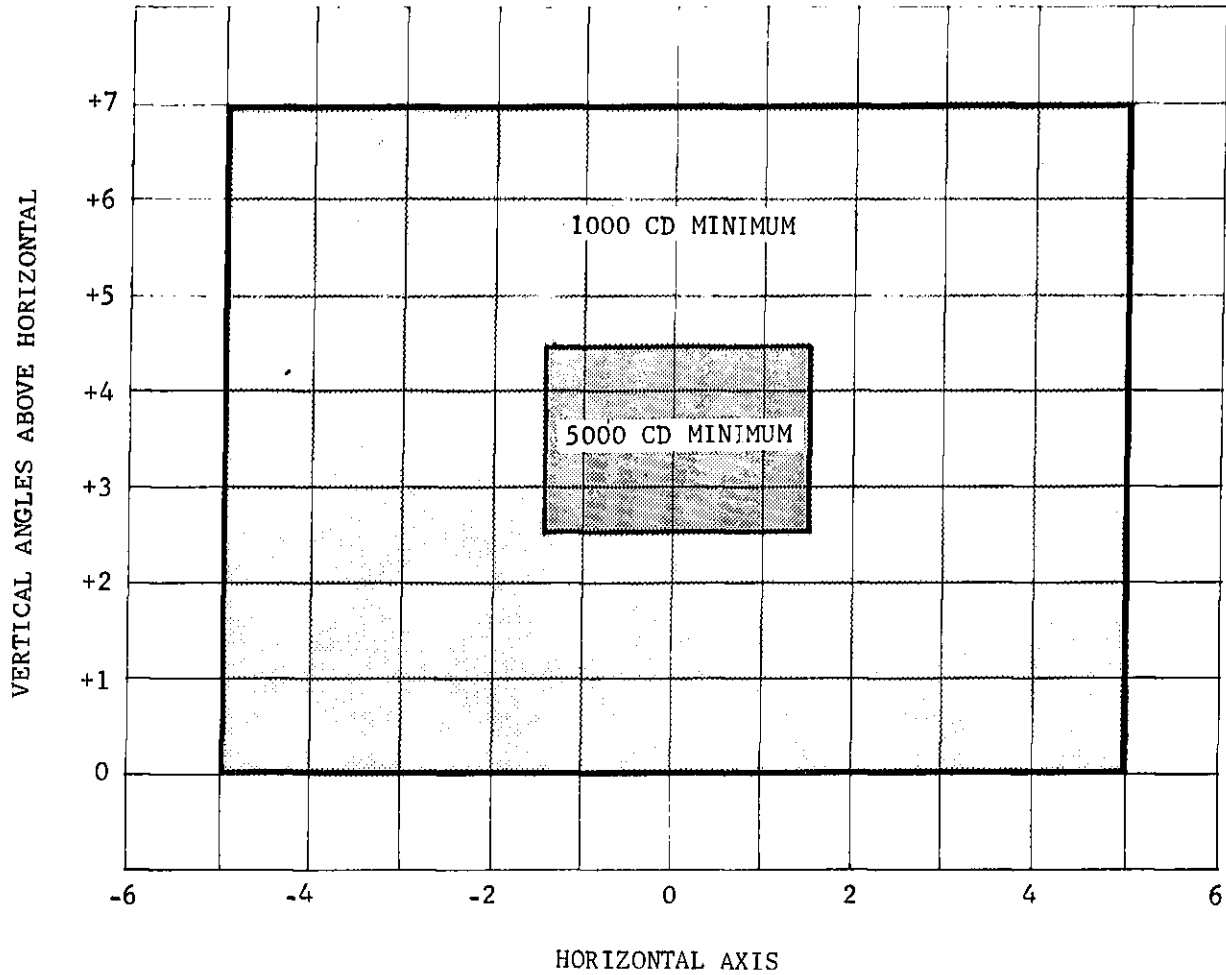
11. HOW TO GET THIS CIRCULAR. Obtain copies of this circular, AC 150/5345- , "Specification for L-838 Semiflush Prismatic Airport Light", from the Federal Aviation Agency, Distribution Section, HQ-438, Washington, D. C. 20553.


Cole Morrow, Director
Airports Service



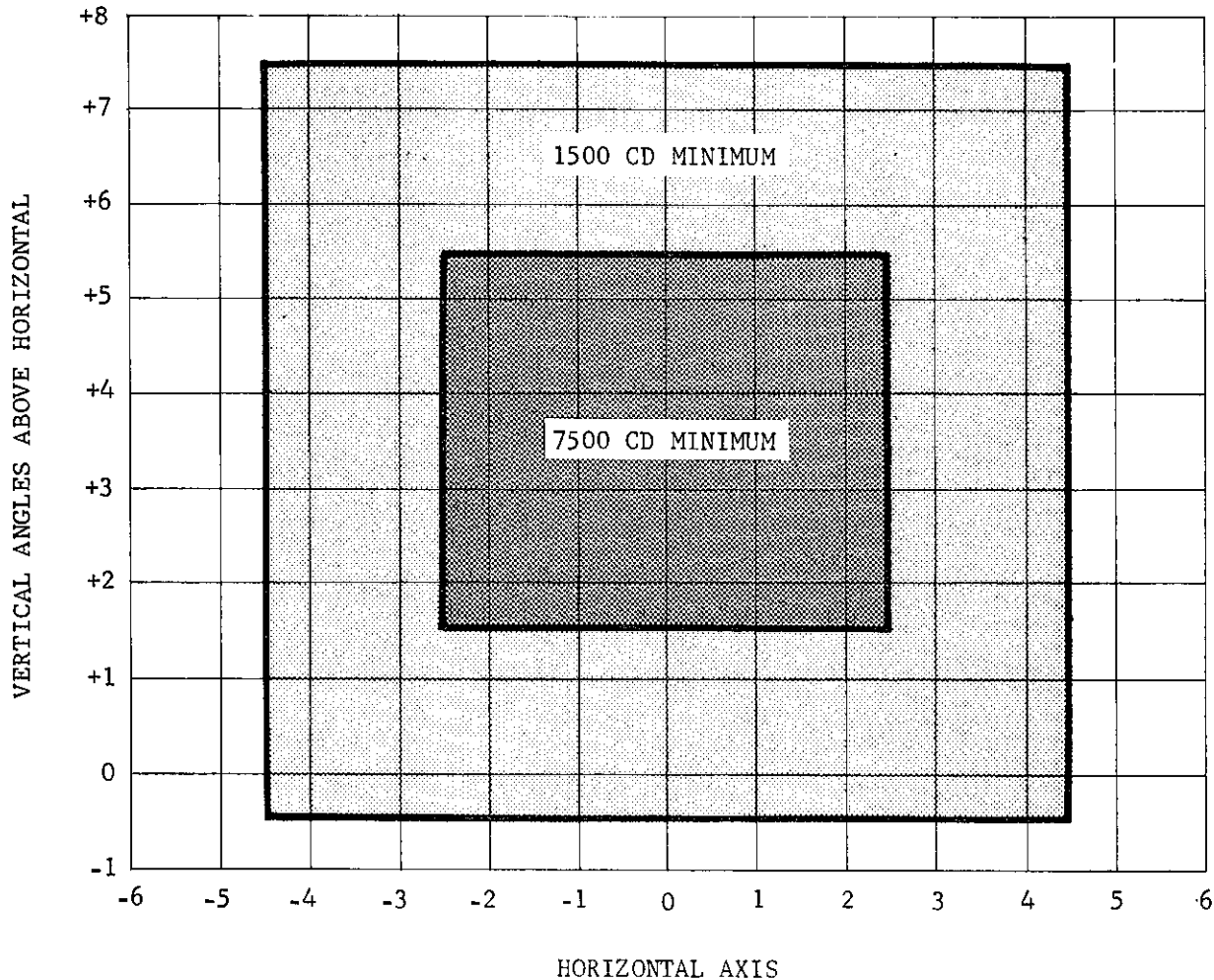
NOTE: A $\pm 1^\circ$ horizontal or vertical shift is permitted for qualification.

FIGURE 4. ISOCANDELA CURVE FOR TYPE IV FIXTURE



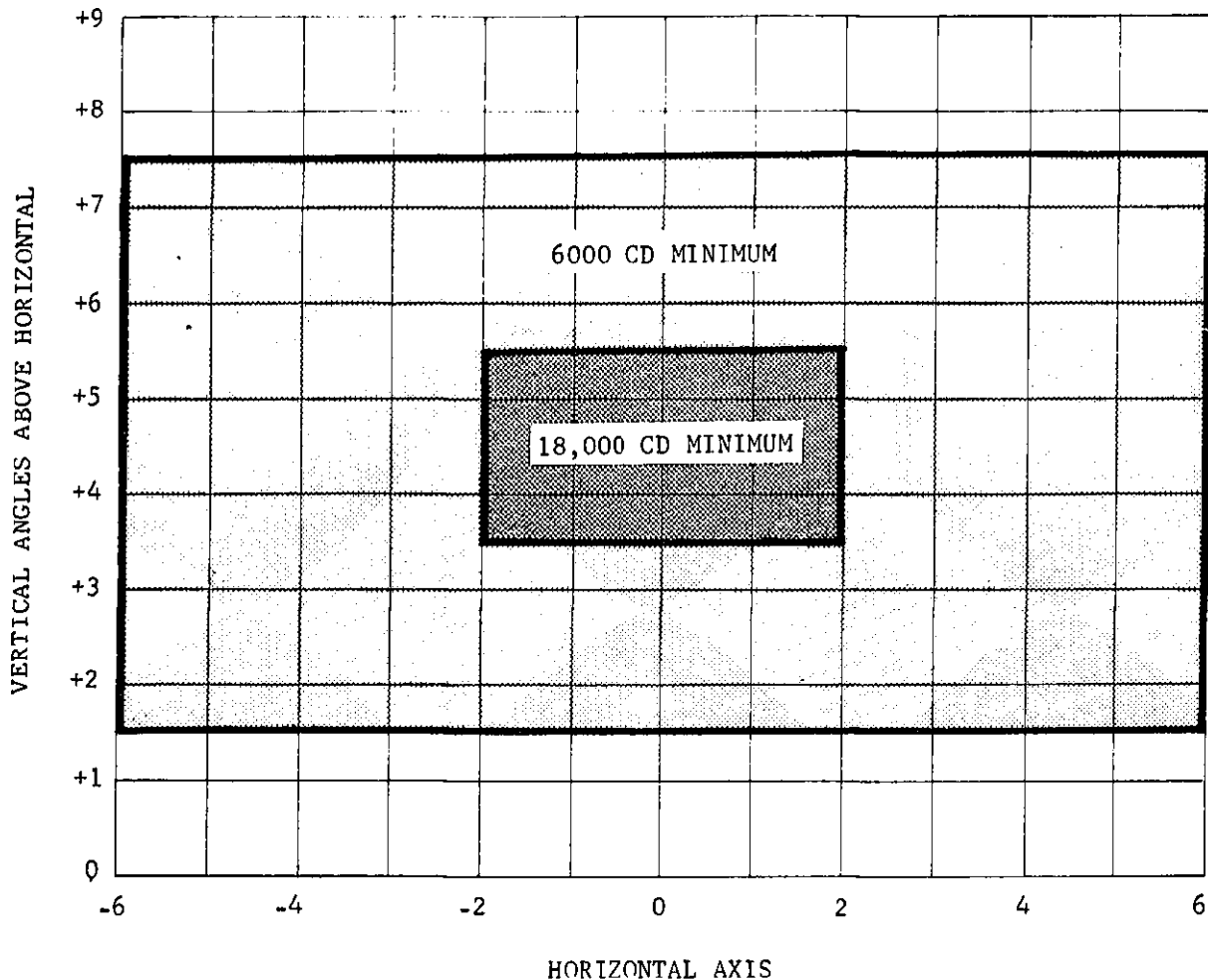
NOTE: A $\pm 1^\circ$ horizontal or vertical shift is permitted for qualification.

FIGURE 3. ISOCANDELA CURVE FOR TYPE III FIXTURE



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

FIGURE 2. ISOCANDELA CURVE FOR TYPE II FIXTURE



- NOTE 1: A $\pm 1^\circ$ horizontal or vertical shift is permitted for qualification.
NOTE 2: 0° in horizontal axis corresponds to $3\frac{1}{2}^\circ$ toe-in angle toward runway centerline.

FIGURE 1. ISOCANDELA CURVE FOR TYPE I FIXTURE