AC 150/5345-46

CHANGE 2

DATE 7/16/79

ADVISORY CIRCULAR

CHANGE

DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Washington, D.C.

Subject: Change 2 to SPECIFICATION FOR SEMIFLUSH AIRPORT LIGHTS--
Adds Unidirectional Threshold Light

1. PURPOSE. This Change adds a unidirectional threshold light for use with a medium intensity approach light system.

The Change number and date of changed material is carried at the top of each page. Changes are indicated by asterisks located in the margins. Pages having no changes retain the same heading information.

PAGE CONTROL CHART

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Appendix 1		18	7/11/75
5, 6	7/11/75	Appendix 1	
		5	7/11/75
		6, 6-1 (and 6-2)	7/16/79

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Suggest filing this transmittal at the back of the AC. It will provide a reference authority for changes, a method of determining that all Changes have been received, and a check for determining if the AC contains the proper pages.

Initiated by: AAS-200

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1. SCOPE AND CLASSIFICATION.

1.1 Scope. - This specification covers semiflush lighting equipment to be used in airport runway and taxiway pavements.

1.2 Classification. - The two categories of semiflush lighting equipment covered by this specification are:

L-850 Runway Lights:
Class A, Bidirectional Centerline Lights
Class B, Unidirectional Touchdown Zone
Class C, Bidirectional Edge Lights
Class D, Bidirectional Threshold Lights
* Class E, Unidirectional Threshold Lights *

L-852 Taxiway Lights:
Class N-1, Narrow Beam Unidirectional
Class N-2, Narrow Beam Bidirectional
Class W-1, Wide Beam Unidirectional
Class W-2, Wide Beam Bidirectional
Class O, Omnidirectional, for Snow Areas
Class Q, Omnidirectional, for No Snow Areas

2. APPLICABLE DOCUMENTS.

2.1 General. - The following documents, of the issue in effect on the date of application for qualification tests, form a part of this specification and are applicable to the extent specified herein:

2.1.1 FAA Specifications. - Copies of the following FAA specifications may be obtained from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

AC 150/5345-1, Approved Airport Lighting Equipment.

AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors.

AC 150/5345-42, FAA Specification L-857, Airport Light Bases, Transformer Housings, and Junction Boxes.

2.1.2 Military Specifications. - Copies of the following military specifications may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120, Attention: Code CDS:

MIL-C-7989, Covers, Light-Transmitting, for Aeronautical Lights, General Specification for.

MIL-C-25050, Color, Aeronautical Lights and Lighting Equipment, General Requirements for.

MIL-P-26915 (USAF), Primer Coating, Zinc Dust Pigmented, for Steel Surfaces.

MIL-STD-810B, Environmental Test Methods.

MIL-STD-889, Dissimilar Metals.

2.1.3 Federal Specifications. - Copies of the following Federal specifications may be obtained from the Business Service Centers of the General Services Administration Regional Offices:

QQ-Z-325, Zinc Coating, Electrodeposited, Requirements for.

QQ-P-416, Plating, Cadmium (Electrodeposited).

ZZ-R-765, Rubber, Silicone.

2.1.4 American Standard. - Copies of ASA B46.1-1962, Surface Texture, Waviness and Lay, may be obtained from the American National Standard Institute, 1430 Broadway, New York, New York 10018.

3. REQUIREMENTS.

3.1 Performance Requirements, L-850.

3.1.1 Photometric Output.

Class A - Figure 1
Class B - Figure 2
Class C - Figure 4
Class D - Figure 5
* Class E - Figure 5-1 *

3.1.2 Lamp Rating. - The lamp(s) in each class of light top assembly shall be series lamp(s) having a nominal rating of 200 watts. They shall have a rated average life of at least 500 hours and shall have a 6.6 ampere filament.

3.1.3 Power Requirements. - In each class of top assembly, all current-carrying parts requiring insulation shall be insulated for at least 600 volts and shall have a current-carrying capacity of 1.5 times the normal operating *current. The total input power to Class A, B, or E lights shall not exceed 330 watts. Total input power to Class C or D lights shall not exceed 440 * watts.

3.1.4 Base Requirements.

L-850-A -Bidirectional centerline light for use on a 12-inch (30.5 CM) diameter Type II L-857 base.

L-850-AS - Bidirectional centerline light for use on a shallow inset base (shown in Figure 3).

L-850-B - Unidirectional touchdown zone light for use on a 12-inch (30.5 CM) diameter Type II L-857 base.

L-850-BS - Unidirectional touchdown zone light for use on a shallow inset base (shown in Figure 3).

L-850-C - Bidirectional edge light for use on a 15-inch (38 CM) diameter Type II L-857 base or for retrofitting on the former L-837 16-inch (40.6 CM) diameter base.

L-850-D - Bidirectional threshold light for use on a 15-inch (38 CM) diameter Type II L-857 base or for retrofitting on the former L-837 16-inch (40.6 CM) diameter base.

* L-850-E - Unidirectional threshold light for use on a 15-inch (38 CM) diameter Type II L-857 base. *

3.2 Performance Requirements - L-852.

3.2.1 Intensity Distribution. - When the lamp in the light assembly is operated at rated current and all components have reached normal operating temperatures, each light beam shall meet its respective intensity distribution requirements as shown in Figure 7, 8, 9, or 10.

3.2.2 Lamp Rating. - The lamp in each class of light top assembly shall be a 6.6 ampere series lamp having a nominal rating of 65 watts for the L-852-W, 45 watts for the L-852-N, and 100 watts for the L-852-O and L-852-Q. All lamps shall have a rated average life of at least 1,000 hours. Requirements for Category III landing minima may alter these specifications.

3.2.3 Power Requirements. - In each class of top assembly, all current-carrying parts requiring insulation shall be insulated for at least 600 volts and shall have a current carrying capacity of 1.5 times the normal operating current.

3.2.4 Base Requirements.

Type I Light Assembly - 8-inch (20.3 CM) diameter for inset directly in the pavement.

Type II Light Assembly - 8-inch (20.3 CM) diameter for installation on a shallow inset base (shown in Figure 6).

Type III Light Assembly - 10-inch (25.4 CM) diameter for installation on a 10-inch (25.4 CM) Type II L-857 base.

Type IV Light Assembly - for installation on a 12-inch (30.5 CM) diameter Type II L-857 base or shallow inset base (shown in Figure 3).

L-852-N and L-852-W shall be manufactured as Type I, II, III or IV.

L-852-O and L-852-Q shall be manufactured as Type III or IV.

3.3 Environmental Conditions. - Each class and type of light assembly shall be capable of performing satisfactorily under the following conditions:

3.3.1 Temperature. - Temperature which ranges from +55° C. to -55° C. See paragraphs 4.1.4 and 4.1.6.

3.3.2 Temperature Shock. - Temperature shock as required in paragraph 4.1.3.

3.3.3 Humidity. - Relative humidity up to 100 percent including conditions where condensation takes place in the form of both water and frost. See paragraph 4.1.10.

3.3.4 Vibration. - Vibration as required in paragraph 4.1.1.

3.3.5 Static Load. - Static load as required in paragraph 4.1.13.

3.3.6 Shock Test. - Mechanical shock as required in paragraph 4.1.11.

*3.3.7 Hydraulic Impact. - The L-850A, B, and E light units shall be designed to withstand, without damage, hydraulic pressures which may be formed by aircraft tires moving at high speeds during operations in wet weather. See paragraph 4.1.12. *

3.4 Design Requirements for Light Assemblies.

3.4.1 Top Assembly. - The metal components for top assembly, excluding bolts, nuts, and washers which are specified elsewhere, shall be fabricated from a ferrous metal capable of meeting the load requirements. Steel having a minimum tensile strength of 50,000 p.s.i. (3515 kgs./sq. cm) and a minimum hardness of 163 Brinell has been used successfully. In areas of heavy snows, the procuring agency may specify that the minimum tensile strength and hardness be increased to Rockwell C 40-50 if suitable precautions are taken to avoid low temperature brittleness. Pry bar slots, indentations, or other suitable provisions shall be made for prying or jacking the top assembly free of the base receptacle when the light assembly is installed in the pavement.

3.4.1.1 Dimensional Requirements - L-850 Light Assemblies.

3.4.1.1.1 Class A and B Light Assemblies. - The principal critical dimensions of the Class A and B top assemblies shall be as listed in this

paragraph and as shown in Figure 3. The outside diameter of the upper portion of the top assembly shall be 11.94 inches, (30.33 CM) ± 0.05 inch (.13 CM). As its outer diameter, the overall thickness of the flange portion that rests on the base flange shall be 0.75 inch (1.90 CM) ± 0.05 inch (.13 CM).

The top assembly flange shall have a portion extending at least 1/4 inch down into the base receptacle to restrict side motion and resist shear action when the unit is struck. The diameter of this extension into the base receptacle shall be 9.94 inches (25.25 CM) +0.00 inch (.00 CM) -0.01 inch (.025 CM). The protrusion into the base receptacle shall contain no fillet or other obstruction to prevent metal-to-metal seating of the bearing surface on the base receptacle. No part of the top assembly shall be more than 1.25 inches (3.18 CM) above the bearing surface of the flange.

All interfaces of the top assembly and base receptacle shall be machined to the same finish as shown in Figure 3. The flange of the upper portion of the top assembly shall have 6 bolt holes equally spaced 60 degrees apart on a bolt-hole diameter of 11.25 inches (28.57 CM), ± 0.01 inch (.025 CM). The bolt holes shall be counterbored or recessed so that the resultant thickness of metal left between the bottom of the counterbored holes and the underneath flange surface is 0.40 inch (1.02 CM) ± 0.015 inch (.038 CM). The bolt holes shall each be 7/16 inch (1.11 CM) in diameter and untapped except for 2 of the bolt holes, 180 degrees apart, which shall be provided with 1/2-13 inch threads for lifting the top assembly. The counterbored holes shall be of sufficient diameter to permit easy removal of the bolts with a standard socket wrench. The light channel(s) shall be centered between the bolt holes. The light channels for the Class A top assembly shall be oriented so that the centers of the two light beams emitted are 180 degrees apart.

The external portion of the top surface extending above the pavement shall be smoothly sloped upward from the edges at angles not exceeding 12 degrees in the direction parallel to the light channel(s) and not exceeding 15 degrees in all other directions. These maximum slope angles shall not apply to the light channels, optical windows, and such indentations as bolt-hole recesses.

The top assembly may be provided with an external rib or other suitable means in the area of the lens(es) to mitigate damage to the head assembly due to action of snowplow blades and aircraft tailhooks.

3.4.1.1.2 Class C, D, and E Light Assemblies. - The Class C, D, and E light assemblies shall be 17.25 inches (43.81 CM) in diameter, ± 0.09 inch (0.23 CM) and have a mounting ring which has six 7/16-inch diameter holes on a 14.25-inch (36.19 CM), ± 0.010-inch (0.025 CM) diameter bolt circle suitable for mounting to a L-857 15-inch (38.10 CM) Type II base receptacle. The mounting ring shall also have a portion extending at least 0.25 inch (0.635 CM) down into the receptacle. The diameter of this extension shall be 12.25 inches (31.11 CM), ± 0.010 inch (0.025 CM). The protrusion into the L-857 base shall contain no fillet or other obstruction to prevent

metal-to-metal seating. At its outer diameter, the overall thickness of the flange portion that rests on the L-857 base shall be 1.25 inches (3.175 CM), ± 0.06 inches (0.152 CM).

*The top assembly of the Class C, D, and E lights shall be a sealed unit capable of being easily inserted and removed from the mounting ring. It shall be capable of resisting all static and dynamic wheel loads without damage. The optical head shall attach to the mounting ring by means of at least six 3/8-inch -16 N.C. bolts on an 11.250-inch (28.57 CM), ± 0.010 inch (0.025 CM) diameter bolt circle. The bolt holes shall be located so that four of the holes will be located 30 degrees from an axis which would be perpendicular to the runway centerline. The remaining two bolts will be 60 degrees from the other bolts on a line parallel to the runway *centerline. Class C, D, and E lights only may protrude 1 inch (2.5 CM) above the pavement surface. *

3.4.1.2 Dimensional Requirements - L-852.

3.4.1.2.1 Type I Light Assembly. - The Type I light assembly shall not require a mounting base for installation in the pavement. The outside diameter shall be 7.94 inches (20.17 CM), ± 0.09 inch (0.23 CM). At the periphery, the depth shall be 1.050 inch (2.67 CM), ± 0.050 inch (0.127 CM). As required, the top surface of the light assembly may slope upwards from the periphery so as to form a maximum protrusion of 0.375 inch (0.95 CM) above the adjacent paved surface when properly installed in the pavement. In forming the permissible 0.375-inch (0.95 CM) rise of the convex top surface, the maximum upward slope of any portion of the top surface, excluding bolt holes, light channels, and recesses for lenses and lens faces, shall not exceed 12 degrees.

3.4.1.2.2 Type II Light Assembly. - The Type II light assembly shall require a mounting base, as shown in Figure 3 of this specification, for installation in the pavement. The diameter and the top surface contour requirements shall be identical to those of the Type I light assembly. The thickness measured at the periphery of the Type II light assembly, or fixture, shall be 0.75 inch (1.90 CM), ± 0.05 inch (0.127 CM) and there shall be a cylindrical protrusion of .25 inch (0.635 CM) to .30 inch (0.762 CM) downward into the mounting base to restrict shear action and side motion with respect to the mounting base. The diameter of this protrusion into the mounting base shall be 6.52 inches (16.56 CM), +0 inch (0 CM) - 0.02 inch (0.05 CM). The inside fillet formed by the protrusion shall have a maximum radius of 1/32 inch (0.08 CM). The mating surfaces between fixture and mounting base shall be smooth and free from burrs or other obstructions that would prevent satisfactory metal-to-metal seating of the bearing surfaces. In unbolted condition, the seating of fixture on mounting base shall be firm, solid, and without discernible rocking motion when subjected to hand pressure. The flange of the fixture assembly shall have four bolt holes spaced as shown in Figure 3. Each hole shall be

receptacle having a suitable means for pressurizing and all bolts torqued to the manufacturer's specifications. Prior to performing this test, the two wire leads shall be subjected to a 30-pound (13.6 KG) tension for 5 minutes to test the integrity of the seal where the leads enter the base receptacle. With a minimum internal pressure of 20 p.s.i. (1.41 KG/Sq. CM), the assembled unit shall be tested using a bubble test material (high foam detergent producing a low-surface tension). The assembly shall be considered watertight if no air bubbles appear.

4.1.10 Humidity Test. - The light assembly shall withstand a humidity test conducted in accordance with Procedure III of MIL-STD-810B for 360 hours. Any evidence of damage, rusting, or corrosion shall be cause for rejection.

* 4.1.11 Shock Test. - For L-850A, B, and E only, the assembled unit shall be mounted rigidly on either a 1-inch-thick (2.5 CM) steel plate or a 4-inch (10 CM) or thicker concrete base. The dimensions of the steel or concrete base shall be at least 3x3 feet (1x1 Meters). The light fixture shall be turned on at full brightness for at least 2 hours prior to starting the test. With the light still on at full brightness, a steel ball weighing 5 pounds (2.27 KG) shall be dropped at the center of the top assembly from a height of 6 feet (1.83 Meters). The steel ball shall be dropped 10 times on the light fixture with a 5-minute interval between each drop. Upon conclusion, the light fixture shall be opened to determine if the optical assembly has been damaged or any component displaced in any way.

4.1.12 Hydraulic Impact Test. - For L-850A, B, and E only, the light assembly shall be submerged in water to a depth of approximately 1/2 inch (1.27 CM). The upper surfaces of the light assembly around the windows shall be encased in a leak proof metal housing with a 1-3/4 inch (4.54 CM) diameter piston. The chamber shall be filled with water and purged of all air. A 5-pound (2.27 KG) steel ball shall be dropped 6 feet (1.73 Meters) onto the steel piston. The light shall show no visible damage after the above test has been repeated five times. The test procedure and a detailed drawing of the test setup shall be submitted to FAA for approval before this test is conducted. *

4.1.13 Horizontal Static Load Test. - The light unit shall be placed in a hydraulic press with a bar attached to the top surface. A load of 3,000 pounds (1360 KG) shall be applied parallel to the light beam. This test shall be repeated 20 times in each direction. There shall be no sign of structural damage, movement of any part, or loosening of fasteners.

4.1.14 Lamp Bypass Test. - The light assembly shall be subjected to a test as described below to determine if the lamp bypass device (incorporated in the fixture) will immediately close an auxiliary circuit around the lamp when its filament opens.

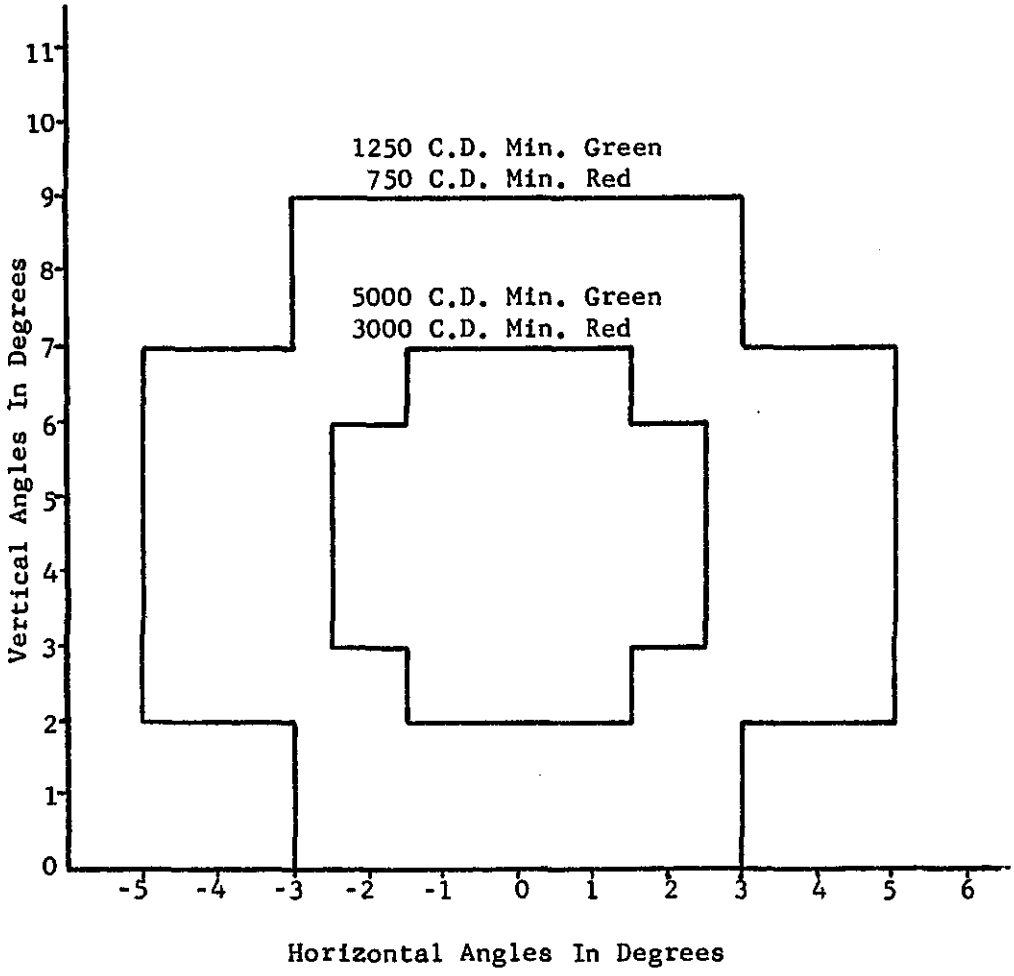
4.1.14.1 L-850 Light Assemblies. - Lamp bypass equipment will be tested to demonstrate the ability to operate at 6.6, 5.2, 4.1, 3.4, and 2.8 amperes within 5 seconds. The source of energy for testing the bypass device shall be the output of an isolation transformer; the size (rating) of the transformer shall be that which is normally used with the lamp.

4.1.14.2 L-852 Light Assemblies. - Two L-852-O or -Q light units, three L-852-W light units or four L-852-N light units shall be assembled to simulate actual operating procedures and connected across the secondary of a 200-watt, Specification L-834 transformer. The primary of the 200-watt transformer shall be connected to a constant current supply. An open lamp filament shall be simulated under the following conditions:

With 6.6 amperes flowing through the primary of the transformer for a minimum of 3 hours, disconnect a lamp in one fixture. The bypass device shall operate within a 5-second period. Without de-energizing the circuit, reduce the current to 4.8 amperes and disconnect a lamp in one of the remaining fixtures. The bypass device shall operate within a 5-second period. With the circuit de-energized, restore the circuit to its original state of readiness, disconnect the lamp in one fixture, set constant current supply for 4.8 amperes output level, and then energize the circuit. The bypass device shall operate within a 5-second period. Repeat the above procedure with the constant current supply set for 6.6 amperes.

4.1.15 Surface Temperature Test. - Tests shall be conducted with each type of light unit to assure that maximum temperature on top of the inset light will not exceed 160° C. (320° F.) when the light is covered with the tire of a heavy ground vehicle for a period of 10 minutes. The light unit shall be operated at high intensity for at least 2 hours, before this 10-minute test period, in still air whose ambient temperature is 25° C. (77° F.). The thermocouple shall be located between the hottest point of the lamphead and the tire to register the test temperature.

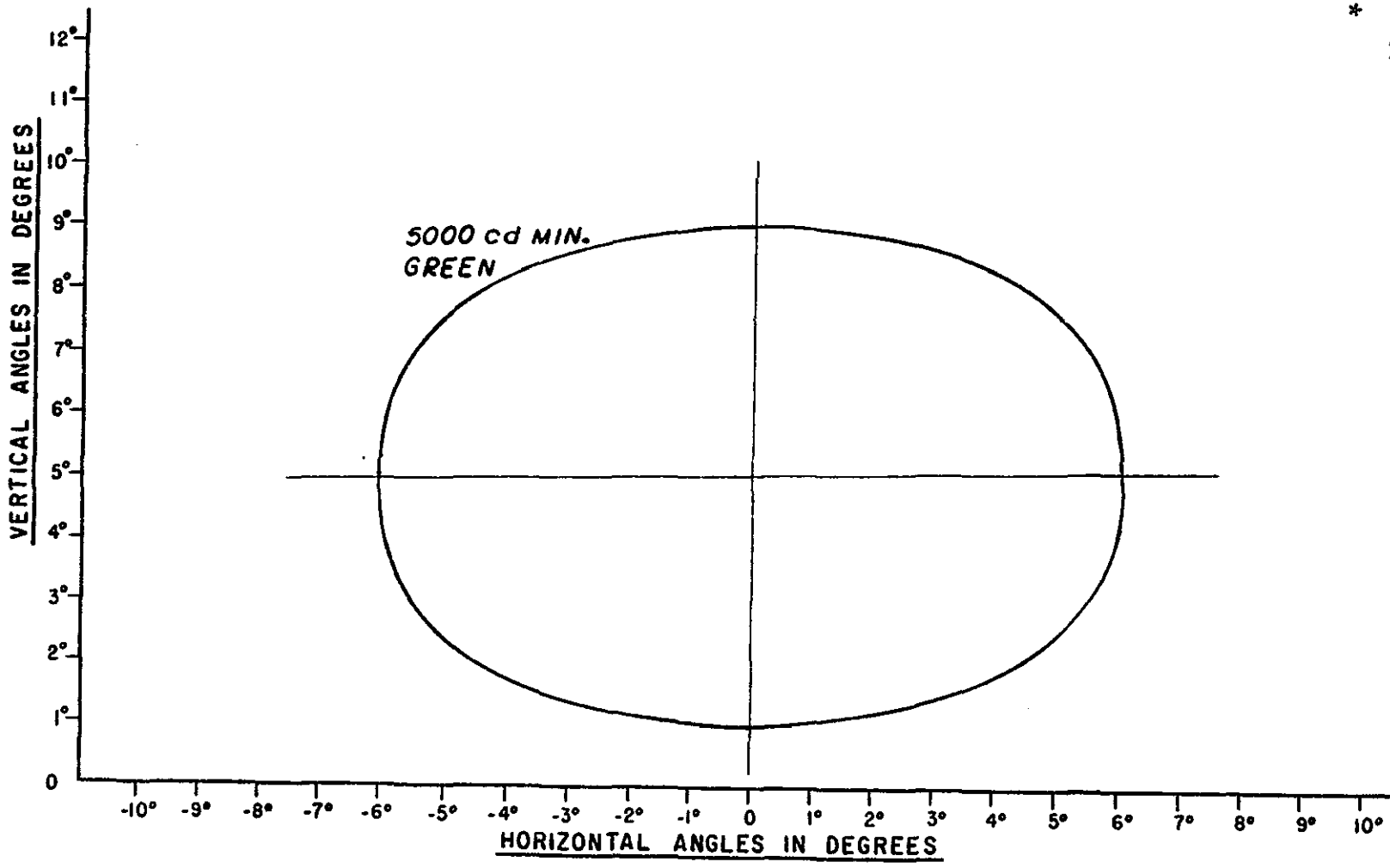
4.2 Production Testing. Each class of top assembly shall be subjected to photometric and leakage tests. In the photometric tests, the applicable top assembly shall meet the intensity distribution requirements of the appropriate figure of Appendix 1. If abbreviated photometric test methods are used for production testing, these methods must have prior approval of the FAA's Airports Service. Each top assembly shall meet the requirements of the leakage test specified in paragraph 4.1.9. Leakage tests on production units shall be accomplished by means of a standard test head and a standard test base. The test head and test base shall be production units properly fitted with pressure fittings to permit the internal pressure of each assembly to be raised to 20 p.s.i. (1.41 KG/Sq. CM). No units which have been tested and have failed to meet these production tests shall be shipped in fulfillment of an order. These tests shall be



NOTE: Photometric measurements must be made in the actual aviation color required after a fifteen minute warm-up period at full rated power.

FIGURE 5. L-850-D ISOCANDELA CURVES

*



NOTE: PHOTOMETRIC MEASUREMENTS MUST BE MADE IN THE ACTUAL AVIATION COLOR REQUIRED AFTER A FIFTEEN MINUTE WARMUP PERIOD AT FULL POWER.

FIGURE 5-1. L-850-E ISOCANDELA CURVE

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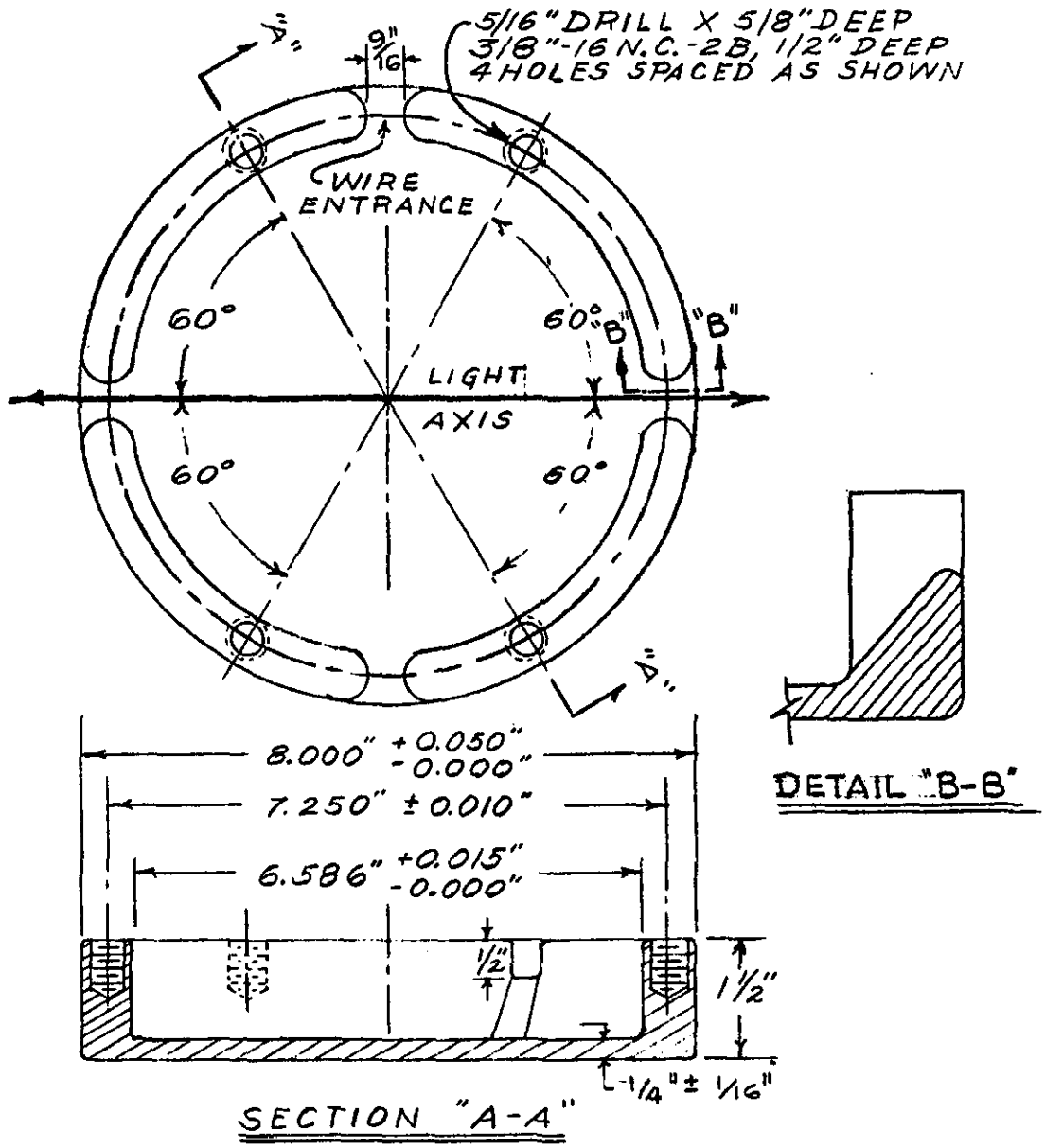

NOTES:
1. Shape of base to be section of a right cylinder with a flat bottom as shown.
2. Where not specified, dimensions shall be held within a tolerance of ± 1/32 inch.
3. The inside top edge of the mounting flange shall be rounded to a radius of 1/8 inch (+ 1/32 inch; -0 inch).
4. Vertical edges of the wire entrance slots shall be rounded to radii of 1/4 inch (+ 1/32 inch). Wire entrance slots may be slanted to interior to allow space for wires.

FIGURE 6. MOUNTING BASE FOR L-852 TYPE II LIGHT ASSEMBLY

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