Cancelled 5345-47

AC NO: 150/5345-31A

DATE: 4/24/70

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: SPECIFICATION FOR L-833 INDIVIDUAL LAMP SERIES-TO-SERIES TYPE INSULATING TRANSFORMER FOR 600-VOLT OR 5,000-VOLT SERIES CIRCUITS

1. PURPOSE. This circular describes the subject specification requirements and is published by the Federal Aviation Administration (FAA) for the guidance of the public.

2. CANCELLATION. This advisory circular replaces AC 150/5345-31, Specification for L-833 Individual Lamp Series-To-Series Type Insulating Transformer for 600-Volt or 3,000-Volt Series Circuits, dated 3 December 1964.

3. REFERENCES. The following advisory circulars, which are in effect on the date of application for qualification (paragraph 10), may be obtained from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D. C. 20590.

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

   b. AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits.

4. SCOPE OF PUBLICATION. The specification requirements are for a completely enclosed rubber-covered insulating transformer for use with 6.6-ampere series airport lighting circuits having nominal voltage ratings up to 5,000 volts. The transformer is designed to be watertight and for direct burial in the earth or installed in a base.

Initiated by: AS-580

5. EXPLANATION OF REVISION. This revision increases the nominal design voltage from 3,000 volts to 5,000 volts.

6. TYPES. Build the transformer in one size. Rate the primary at 6.6 amperes, 60 Hz, and the secondary at 6.6 amperes. Rate the transformer at 30/45 watts to permit the operation of either a 30 or 45-watt, 6.6-ampere series lamp.

7. PERFORMANCE REQUIREMENTS.

a. Design the transformer so that its characteristics will be within the limits set forth in Figure 1.

FIGURE 1. TRANSFORMER CHARACTERISTICS

Transformer Rating (Watts)	Primary Amperes	Primary Power Factor (Min.)	Efficiency (Min.)	Secondary Amperes	Load
30-45	6.6	95%	80%	6.53-6.67	1.15 Ohms (45-Watt Lamp Plus Losses)
30-45	6.6	95%	80%	6.53-6.67	0.80 Ohms (30-Watt Lamp Plus Losses)
30-45	6.6	---	---	6.6-7.1	Short Circuited

b. Temperature Rise. When the transformer is operated at rated load or when short-circuited with rated current and frequency in the primary, the temperature rise is not to exceed 55 degrees Centigrade (131 degrees Fahrenheit) as determined by the resistance method.

c. Insulation. Insulate the transformer for operation from a 5,000-volt primary.

d. Continuous Outdoor Service. Construct the transformer for continuous outdoor service; i.e., buried directly in the ground, installed in an open or sealed base, or submerged in water. Design the transformer for continuous outdoor service in an ambient temperature range from a minimum of -45 degrees Fahrenheit to a maximum of +120 degrees Fahrenheit.

e. Core and Coil. Completely insulate the windings from the core and from each other.

8. DETAIL REQUIREMENTS.

a. Housing.

(1) Completely enclose in the housing the core and coil assembly with leads sealed into the housing in such a way as to produce a completely watertight unit. Design all exposed parts of the transformer to be capable of withstanding outdoor exposure, immersion in water, or direct burial in earth containing large concentrations of oils, acids, or alkalis.

(2) Use rubber, synthetic rubber, or rubber-like compound for the housing material. Other synthetic compounds may be used for the housing subject to prior inspection and approval by the FAA, Airports Service, Washington, D. C.

(3) Make no portion of the case less than 1/4-inch thick, and close all seams by permanent bonds. Permanently bond the housing to the sheath of the primary and secondary leads. Keep the internal air pockets or voids to a minimum, and make the assembly sufficiently rugged to withstand rough handling.

(4) The shape of the transformer housing may be optional, but keep the overall dimensions of the housing, excluding the leads, so that the finished product can fit easily inside a space defined as a cylinder of seven inches in diameter by eight inches in height inside dimensions.

(5) Mold the following information on the surfaces of the transformer case or permanently marked on a nameplate attached to the transformer.

(a) Transformer, Series-To-Series 6.6/6.6 Amperes, 60 Hz.

(b) Watts 30-45 Volts 5,000

(c) Manufacturer's Name or Trademark _____

(d) Manufacturer's Catalog Number _____

b. Transformer Leads.

(1) Equip each transformer with two single-conductor primary leads and one two-conductor secondary lead for applications where mating connectors are attached to the supply cables for plugging directly into the transformer connectors described below.

(a) Equip one primary lead with a plug-type connector conforming to Figure 6a of AC 150/5345-26 (Spec. L-823). Equip the other primary lead with a receptacle conforming to Figure 6b of Specification L-823. Use No. 8 AWG, 19 strand, single conductor insulated cable for not less than 5,000 volts for the primary cable leads. Use cable conforming to the requirements of AC 150/5345-7 (Spec. L-824). Extend each primary lead 19 inches, ± 3 inches beyond the housing, including the connector.

(b) Equip the secondary lead with a receptacle conforming to Figure 1c of Specification L-823. Use No. 14 AWG, Two-Conductor, 600-Volt Cable, conforming to the provision of Underwriters' Laboratories requirement for Type SO cord for the secondary cable lead. Extend the secondary lead 42 inches, ± 3 inches, beyond the housing, including the cable connector.

(2) Furnish an approved watertight cap and plug on each mating part of each plug or receptacle for protection during shipment and installation.

(3) Furnish the pigtail leads specified below when specific orders require extra pigtail leads, equipped with plug-in connectors, for field splicing to primary supply cable.

(a) A length of Specification L-824, Type B, No. 8 AWG, 5KV cable with a mating plug, Figure 6a of Specification L-823, vulcanized at one end having an overall length of not less than 15 inches.

(b) A length of Specification L-824, Type B, No. 8 AWG, 5KV cable with a mating receptacle, Figure 6b of Specification L-823 vulcanized at one end having an overall length of not less than 15 inches.

9. TESTING.

a. Qualification Testing. Submit sample transformers equipped with pigtail leads to be tested by a disinterested testing laboratory as follows.

(1) Performance Tests. Check the performance requirements of the transformer as defined in paragraphs 7a and 7b to determine conformance.

(2) Impact Tests. Drop the transformer from a height of four feet upon a concrete surface, once so it hits on the bottom of the case and once so it hits on the side of the case. Conduct this test subsequent to the electrical characteristic tests required for paragraph 7a. Following this test, subject the transformer again to the electrical characteristic tests. Any failure or change of more than one percent in the results obtained in the electrical characteristic tests will be cause for rejection.

(3) Insulation Resistance Test. Equip the transformer with pigtail leads for this test. Tape the joints where the connectors come together to prevent separation from handling.

(a) Subject the transformer to a continuous 20-cycle test. For each test cycle, operate the transformer for a minimum of five hours in air, at room temperature, with 6.6 amperes flowing in the primary and with the secondary open-circuited. Immediately immerse the transformer and its three connectors (with mating connectors installed) in tap water, at room temperature, and soak not less than 12 hours.

(b) Measure the direct current insulating resistance immediately after immersion (before transformer cools) and measure again after the soaking period. Measure the insulation resistance after the voltage shown in Figure 2 has been applied for one minute between each coil and ground with the other coil grounded. Cause for rejection will be any insulation resistance less than the values specified in Figure 2. Check the zero and maximum reading of the test instrument periodically by suspending the high voltage lead in the air and immersing it in water.

FIGURE 2. INSULATION RESISTANCE

D.C. TESTS		MINIMUM INSULATION RESISTANCE	
Coil	Voltage	Cold	Hot
		In Megohms	
Secondary (600V)	3,000	1,000	300
Primary (5,000V)	15,000	2,000	750

b. Production Testing. Make the following tests on each transformer to determine that the final assembly will withstand the following tests successfully.

(1) Manufacturers shall test each transformer for current ratio at rated frequency and current on the primary and rated load on the secondary. Each transformer's secondary current must be within the limits specified in Figure 1.

(2) Subject each transformer to one complete cycle of tests specified in paragraph 9a(3). The transformer may be heated to a temperature known equal to or exceeding the temperature as specified in paragraph 9a(3).

c. Additional Inspection and Tests. Additional inspection and tests shall be made as deemed necessary by the FAA to determine compliance with this specification.

10. QUALIFICATION.

a. Furnish sample transformers to a disinterested independent testing laboratory acceptable to the FAA, Airports Service, to be tested as described in paragraph 9a, to obtain certification regarding the ability to manufacture the transformer meeting the requirements of this specification. The manufacturer shall furnish two copies of the test report, with a letter of request for approval to the FAA, Airports Service, Washington, D. C. 20590, for review and approval consideration. Cost of testing shall be borne by the manufacturer offering the equipment for approval.

b. If the manufacturer has satisfactory laboratory facilities, the tests may be performed at the factory. These tests shall be witnessed by a representative of the FAA, Airports Service. The manufacturer shall provide a written report of these tests.

c. Manufacturers shall furnish the following in addition to the tests performed by the independent laboratory or by the manufacturer.

(1) A production model to the FAA, Airports Service, Washington, D. C., for physical inspection. Cost of submitting the production model shall be borne by the manufacturer.

(2) Parts lists, installation instructions, and drawings to the FAA, Airports Service, Washington, D. C. 20590, for review and approval.

d. Upon approval of the disinterested independent laboratory's or manufacturer's test reports, and the additional data required in paragraph 10c, which have shown satisfactory conformance to the specification requirements, the Airports Service shall list the name of the qualified manufacturer and a description of its transformer in AC 150/5345-1B, Approved Airport Lighting Equipment.

e. At any time after approval has been granted under the above conditions, a certified factory test report on the latest production model produced under this specification shall be made available by the manufacturer upon written request by the FAA, Airports Service, Washington, D. C. 20590.

f. Manufacturers shall not undertake a change of material or manufacturing methods or revision of catalog numbers of approved transformers without prior concurrence of the FAA, Airports Service.

11. HOW TO OBTAIN THIS CIRCULAR. Obtain additional copies of AC 150/5345-31A, Specification for L-833 Individual Lamp Series-to-Series Type Insulating Transformer for 600-Volt or 5,000-Volt Series Circuits, from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D. C. 20590.

Chester G. Bowers
Director, Airports Service

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Washington, D.C. 20590

Official Business

PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
FEDERAL AVIATION ADMINISTRATION