



U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: Specification for L-824
Underground Electrical Cable for
Airport Lighting Circuits

Date: 8/19/2013

AC No: 150/5345-7F

Initiated by: AAS-100

Change:

1. **Purpose.** This advisory circular (AC) comprises the Federal Aviation Administration (FAA) specifications for L-824 underground electrical cable for airport lighting circuits.
2. **Effective Date.** Effective 6 months after the issue date of this AC, only cable qualified with the specifications herein will be listed in AC 150/5345-53, Airport Lighting Equipment Certification Program.
3. **Cancellation.** AC 150/5345-7E, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits, dated August 2, 2001, is canceled.
4. **Application.** The FAA recommends the specifications contained in this AC for the development of airport lighting circuits using L-824 underground electrical cable. The use of these specifications is mandatory for airport projects receiving FAA-administered Federal funds under such programs as the Airport Improvement Program or the Passenger Facility Charge Program.
5. **Principal Changes.** The following principal changes have been incorporated:
 - a. Updated all references to latest revisions.
 - b. Updated all internet links for obtaining publications.
 - c. Deleted FAA-STD-013, Quality Control Program Requirements. Replaced with ANSI/ISO 9001, Quality Management Systems – Requirements.
6. **Metric Units.** Throughout this AC, customary English units are used followed with “soft” (rounded) conversion to metric units. The English units govern.

Michael J. O'Donnell
Director of Airport Safety and Standards

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SPECIFICATION FOR L-824 UNDERGROUND ELECTRICAL CABLE FOR AIRPORT LIGHTING CIRCUITS

1. Scope and Classification.

1.1 Scope. This specification covers requirements for underground electrical cable intended for use in airport lighting circuits.

Type B Single and multiple conductor cables rated 600 volts and 5,000 volts having ethylene propylene insulation and an overall jacket.

Type C Single and multiple conductor cables rated 600 volts and 5,000 volts having cross-linked polyethylene insulation. Multiple conductor cables and shielded cable must have an overall jacket.

This specification does not apply to wire or cable used to manufacture Class A connectors per AC 150/5345-26, FAA Specification for L-823 Plug and Receptacle, Cable Connectors, or for the manufacture of the transformer leads per AC 150/5345-47, Specification for Series to Series Isolation Transformers for Airport Lighting Systems.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids, for additional information about acceptable wire insulation types and installation guidelines. See also AC 150/5370-10, Standards for Specifying Construction of Airports, for additional information about wire insulation types.

2. Applicable Documents.

2.1 General. The following documents in effect on the date of request for approval form a part of this specification to the extent specified herein. In the event of conflict, this specification must govern.

2.1.1 American National Standards Institute (ANSI)/International Organization for Standardization (ISO):

ISO 9001:2008	Quality Management Systems - Requirements
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2.1.2 Insulated Cable Engineers Association, Inc. (ICEA)/ National Electrical Manufacturers Association (NEMA) Publications:

ANSI/ICEA S-95-658 / NEMA WC70 – 2009	Power Cables Rated 2000 V or Less for Use in the Distribution of Electrical Energy
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ANSI/ICEA S-96-659 / NEMA WC71 – 1999	Standard for Non-Shielded Cables Rated 2001-5000 V for Use in the Distribution of Electrical Energy
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ICEA S-93-639 / NEMA WC74 – 2000	5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electrical Energy
ANSI/ICEA T-26-465 / NEMA WC54 – 2008	Guide for Frequency of Sampling Extruded Dielectric Power, Control, Instrumentation and Portable Cables for Test

FAA ACs are available for download on the FAA Airports Web site:

http://www.faa.gov/airports/resources/advisory_circulars/.

Copies of ICEA/NEMA publications may be purchased from the International Cable Engineer's Association, Inc. (ICEA) website:

www.icea.net/Public_Pages/Documents/NewPowerDocumentsPage.html.

3. Requirements.

3.1 General. The cable must be suitable for the intended application and must be manufactured consistent with the best commercial practices.

3.1.1 Detail Requirements. The cable type must be manufactured per the requirements and options (where applicable) in Table 1.

3.2 Marking. The cable must be durably marked with the manufacturer's name or trademark, cable trade name or catalog number, conductor size, and voltage rating. The markings must be repeated at regular intervals not exceeding 24 inches (0.6 meters (m)). The markings must not decrease the jacket or insulation thickness to less than the specified value.

4. Quality Assurance Provisions.

4.1 Qualification Requirements.

4.1.1 Qualification Request. Procedures for obtaining qualification approval are in the latest edition of AC 150/5345-53, Airport Lighting Equipment Certification Program.

4.1.2 Qualification Testing. All cable intended for qualification to this AC must comply with the requirements in paragraph 4.2.

4.1.3 Quality Control Provisions. The manufacturer must provide and maintain a quality control program per ANSI/ISO 9001 (an onsite FAA Quality and Reliability Officer (QRO) is not required) or equivalent Department of Defense quality standards (example: MIL-Q-9858A).

4.1.4 Guarantee. The manufacturer must provide the following minimum guarantee for each cable: that the cable has been manufactured and will perform per this specification and that any defect in material or workmanship that may occur during proper and normal use during a period

of 1 year from the date of installation or a maximum of 2 years from date of shipment will be corrected or replaced by the manufacturer.

4.2 Qualification Testing. Qualification testing must be performed on each insulation type and voltage rating of cable, per Table 1.

4.3 Production Testing. Production sample tests must be performed at the frequency per ICEA T-26-465/ NEMA WC54. Where no frequency is specified, testing frequency must be determined by the product certification organization. At a minimum, production testing must include the High Voltage Spark and Insulation Resistance.

4.4 Production Test Records. At any time after approval has been granted under this specification, a certified copy of factory test reports on the most recent runs of any type of cable meeting this specification must be made available by the manufacturer upon written request by the FAA. Production testing records must be maintained for a period of 3 years and made available for review by the third-party certifier's quality inspection personnel.

Table 1. Cable Requirements

CABLE TYPE	B		C	
	600	5000	600	5000
1. CONDUCTOR				
a. Material: Coated and uncoated copper	x	x	x	x
b. General Requirements:				
ICEA S-95-658, Section 2	x	--	x	--
ICEA S-96-659, Section 2, non-shielded	--	x	--	x
ICEA S-93-639, Section 2, shielded	--	x	--	x
c. Stranding: 7-wire Class B strand or	x	x	x	x
19-wire Class C strand	x	x	x	x
d. Size: AWG	12-4	8-4	12-4	8-4
e. Conductor stress control (conductor shield)				
ICEA S-96-659, Section 3, non-shielded	--	optional	--	optional
ICEA S-93-639, Section 3, shielded	--	x	--	x
2. INSULATION				
a. Material:				
Ethylene Propylene Rubber				
ICEA S-95-658, Class E-1 or E-2	x	--	--	--
ICEA S-96-659, Class E-1 or E-2 or E-4, non-shielded	--	x	--	--
ICEA S-93-639, Class I, II, or IV, shielded	--	x	--	--
Cross-linked Polyethylene				
ICEA S-95-658, Class X-1 or X-2 or X-3	--	--	x	--
ICEA S-96-659, Class X-1 or X-2, non-shielded	--	--	--	x
ICEA S-93-639, Class XLPE, shielded	--	--	--	x
b. Thickness:				
ICEA S-95-658, Table 3-4, column B	x	--	--	--
ICEA S-95-658, Table 3-4, column A (single cond.)	--	--	x	--
ICEA S-95-658, Table 3-4, column B (multi-cond.)	--	--	x	--
ICEA S-96-659, Table 4-2 (single cond.), non-shielded	--	x	--	x
ICEA S-96-659, Table 4-3 (multi-cond.), non-shielded	--	--	--	x
ICEA S-93-639, Table 4-3, shielded	--	x	--	x
3. SHIELDING				
Nonmetallic covering and metallic tape:				
ICEA S-93-639, Section 5 & 6	--	optional	--	optional

CABLE TYPE	B		C	
	600	5000	600	5000
4. MULTIPLE CONDUCTOR CABLE				
Cable assembly:				
ICEA S-95-658, Section 5	X	--	X	--
ICEA S-96-659, Section 6, non-shielded	--	X	--	X
ICEA S-93-639, Section 8, shielded	--	X	--	X
5. JACKET				
a. Material:				
Heavy-Duty Neoprene				
ICEA S-95-658, Par. 4.1.3	X	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.3, non-shielded	--	X	--	optional
ICEA S-93-639, Par. 7.1.2, shielded	--	X	--	X
Heavy-Duty Chlorosulfonated Polyethylene				
ICEA S-95-658, Par. 4.1.11	X	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.11, nonshielded	--	X	--	optional
ICEA S-93-639, Par. 7.1.10, shielded	--	X	--	X
Polyvinyl Chloride				
ICEA S-95-658, Par. 4.1.5	X	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.5, non-shielded	--	X	--	optional
ICEA S-93-639, Par. 7.1.4, shielded	--	X	--	X
Polyethylene				
ICEA S-95-658, Par. 4.1.6	X	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.6, non-shielded	--	X	--	optional
ICEA S-93-639, Par. 7.1.5, shielded	--	X	--	X
Chlorinated Polyethylene, Thermoplastic				
ICEA S-95-658, Par. 4.1.12	X	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.12, non-shielded	--	X	--	optional
ICEA S-93-639, Par. 7.1.11, shielded	--	X	--	X
Chlorinated Polyethylene, Cross-Linked, Heavy Duty				
ICEA S-95-658, Par. 4.1.13	X	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.13, non-shielded	--	X	--	optional
ICEA S-93-639, Par. 7.1.12, shielded	--	X	--	X
b. Thickness				
(1) Single conductor, non-shielded				
ICEA S-95-658, Table 4-2	X	--	--	--
ICEA S-96-659, Table 4-2	--	X	--	optional

CABLE TYPE	B		C	
	600	5000	600	5000
5. JACKET (continued)				
(2) Single conductor, shielded				
ICEA S-93-639, Table 7-3	--	x	--	x
(3) Multiple conductor				
ICEA S-95-658, Table 4-4	x	--	x	--
ICEA S-96-659, Table 5-3, non-shielded	--	x	--	x
ICEA S-93-639, Table 7-3, shielded	--	x	--	x
6. COMPONENT TESTS				
Conductor, Conductor stress control layer, Insulation, Insulation shield and Jacket:				
ICEA S-95-658, Section 6	x	--	x	--
ICEA S-96-659, Section 7	--	no shield	--	no shield
ICEA S-93-639, Section 9	--	shielded	--	shielded
7. HIGH VOLTAGE TESTS				
Test methods must be per—				
ICEA S-95-658, Section 6	x	--	x	--
ICEA S-96-659, Section 7	--	no shield	--	no shield
ICEA S-93-639, Section 9	--	shielded	--	shielded
Test voltages must be per a, b, c, or d				
a. High voltage – ac				
ICEA S-95-658, Table 3-4	x	--	x	--
ICEA S-96-659, Table 4-2	--	no shield	--	no shield
ICEA S-93-639, Table 4-1	--	shielded	--	shielded
b. High voltage - dc (alternate to ac)				
ICEA S-95-658, Table 3-4	x	--	x	--
ICEA S-96-659, Table 4-2	--	no shield	--	no shield
ICEA S-93-639, Table D-1	--	shielded	--	shielded
c. High voltage spark test - ac				
ICEA S-95-658, Table 3-4	x	--	x	--
d. High voltage spark test - dc (alternate to ac)				
ICEA S-95-658, Table 3-4	x	--	x	--

CABLE TYPE	B		C	
	600	5000	600	5000
8. <u>DISCHARGE RESISTANCE TESTS</u>				
Single conductor, non-shielded only				
ICEA S-96-659, Table 4-5, no jacket	--	--	--	x
ICEA S-96-659, Table 5-1, with jacket	--	x	--	x
ICEA S-96-659, E-4 Insulation, Tables 4-5 & 7-1		x		
9. <u>INSULATION RESISTANCE</u>				
ICEA S-95-658, Par. 6.10.2	x	--	x	--
ICEA S-96-659, Par. 7.11.2	--	no shield	--	no shield
ICEA S-93-639, Par. 9.12.3	--	shielded	--	shielded
10. <u>PARTIAL DISCHARGE</u>				
ICEA S-93-639, Par. 9.12.2, shielded	--	x	--	x

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