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EIA STANDARD

Metallized Film Dielectric Capacitors for Alternating Current Application

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ELECTRONIC INDUSTRIES ASSOCIATION
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FIXED METALLIZED FILM DIELECTRIC CAPACITORS FOR ALTERNATING CURRENT APPLICATIONS

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**METALLIZED FILM DIELECTRIC CAPACITORS
FOR ALTERNATING CURRENT APPLICATIONS****I. SCOPE**

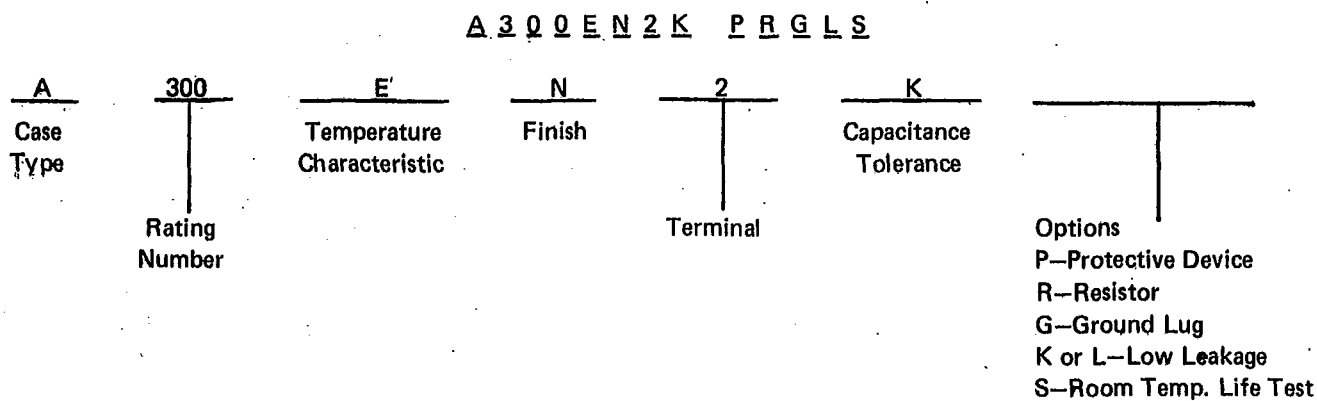
- 1.1 This standard describes the requirements for metallized electrode film dielectric capacitors, dry or Non-PCB liquid filled, and sealed in metal cases or in non-metal cases made of self-extinguishing material. They are intended for use in lighting ballasts, ferroresonant transformer power supplies, some power factor correction, with motors and other general purpose applications. The capacitors are rated for service in 50 Hz to 60 Hz circuits at case temperatures shown in Paragraph 3.4.

2. DEFINITIONS

- 2.1 Rated voltage is the design steady state RMS operating voltage that may be applied between the terminals of the capacitor (see Paragraph 23.2).
- 2.2 Rated case temperature is the maximum allowable hot spot temperature developed at any point on the case surface during maximum operating conditions. (See Paragraph 23.3).
- 2.3 Self-healing is the property of a capacitor to restore the dielectric to an acceptable condition after dielectric breakdown occurs.
- 2.4 Capacitor failure is any abnormal condition of operation as described below.
- (a) Continuous or intermittent open circuit between capacitor terminals.
 - (b) Continuous short circuit between capacitor terminals or between terminals and case.
 - (c) Dissipation factor in excess of 0.15% for Characteristic E and F, and in excess of 0.9% for Characteristic G and H capacitors.
 - (d) Loss of capacitance of more than 3%.
- 2.5 Self-extinguishing material as used in paragraph 1.1 is a generic term whose exact meaning as it applies to selection of material and design of cases is left to the capacitor manufacturer or user.
- 2.6 Service life objective is described in paragraph 23.1 on page 11.

3. STANDARD DESIGNATION

3.1 E.I.A. Standard Designation shall consist of seven parts as illustrated below with options indicated.



3.2 Metal cased types shall be identified by a single letter. Non-metal cased types shall be identified by a double letter. Case material may be metal or non-metal as specified by agreement between the user and the manufacturer.

Case Type*	Nominal Dimensions Over Seam Cover For Oval and Rectangular Cases Nominal Outside Diameter for Cylindrical Case		Shape
	Inches	Millimeters	
A	2.16 x 1.31	54.8 x 33.3	(1 - 1-1/4") Flat Oval
B	2.69 x 1.56	68.3 x 39.6	(1 - 1-1/2") Flat Oval
C	2.91 x 1.91	73.9 x 48.5	(1-3/4") Flat Oval
D	3.66 x 1.97	92.9 x 50.0	(2") Flat Oval
M or MM	1.50	38	Cylindrical
N or NN	1.63	41.4	Cylindrical
P or PP	1.75	44.5	Cylindrical
S or SS	2.00	50.8	Cylindrical
T or TT	2.50	63.5	Cylindrical

*Example: S identifies Metal Case

SS identifies Non-Metal Case

- 3.3 Rating numbers are noted on parts lists sheets of appendix for capacitance and voltage rating. This is a three digit sequential non-significant number which has been assigned by E.I.A.
- 3.4 Characteristic shall be identified by a single letter to denote the temperature range and dielectric of the capacitor shown below.

<u>Characteristic</u>	<u>Case Temp. Range</u>	<u>Max. DF in % 23°C to Max. Temp.</u>	<u>Cap. Change from 23°C</u>	
			<u>To -40°C</u>	<u>To Max. Temp.</u>
E	-40°C to 70°C	0.1	+2% to -5%	+2% to -5%
F	-40°C to 90°C	0.1	+2% to -5%	+2% to -7%
G	-40°C to 70°C	0.6	+2% to -5%	+8% to -2%
H	-40°C to 90°C	0.6	+2% to -5%	+10% to -2%

Characteristics E and F are made with metallized polypropylene or equivalent.

Characteristics G and H are made with metallized polyethylene terephthalate or equivalent. (See Paragraph 23.10)

- 3.5 Finish shall be identified by a single letter as shown below:

<u>Code Letter</u>	<u>Type of Finish</u>
N	No finish subsequent to case fabrication
P	Underwriters' Laboratories recognized paint, or equivalent
Q	Underwriters' Laboratories recognized plating, or equivalent

- 3.6 Terminals shall be identified by a single digit code as shown below:

Code

1. Insulating cup 1/4" quick-connect — two tines
2. Insulating cup 1/4" quick-connect — four tines
3. Insulating cup 1/4" quick-connect — two or three tines and forked solder lug
4. Code 1 and Code 2 on same capacitor
5. Insulating cup 1/4" quick-connect — three tines
6. Code 1 and Code 5 on same capacitor

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3.7 Capacitance tolerance shall be identified with a single letter as shown below:

<u>Code Letter</u>	<u>Capacitance Tolerance</u>
L	$\pm 3\%$
H	$\pm 6\%$
K	$\pm 10\%$

3.7.1 Tolerance color code may be requested for certain applications but shall only apply to code letter H ($\pm 6\%$). Color tolerance dot shall be placed on the cover surface of the capacitor. The color dot shall be as shown below:

<u>Color Code</u>	<u>Capacitance Range from Nominal</u>
Black	-6% to -3%
White	-3% to 0
Yellow	0 to +3%
Red	+3% to +6%

3.8 Design options are described in Paragraphs 3.8.1 through 3.8.5.

3.8.1 Protective device shall be identified by the letter "P". Capacitors containing the protective device shall be recognized by Underwriters' Laboratories, or equivalent.

3.8.1.1 This protective device is intended to prevent case rupture and expulsion of internal material when used within the current and voltage fault rating of this device.

3.8.1.2 A minimum clearance above the capacitor terminals is required for effective operation of the protective device. Manufacturer should be consulted for minimum recommended clearance after installation.

3.8.2 Discharge resistor shall be identified by the letter "R" and shall discharge the capacitor to 50 volts or less within one minute after disconnection of the capacitor from the voltage supply.

3.8.3 Ground lug shall be identified by the letter "G". (See Appendix for ground lug details.)

3.8.4 Leakage current to case.

3.8.4.1 Low leakage current to case, required by UL1012 and UL1029, for some lighting and power supply applications shall be identified by the letter "K". The leakage current value shall be determined by agreement between the supplier and the user.

3.8.4.2 Low leakage current to case for motor application shall be identified by the option letter "L". When 115 volts 60 Hz is applied between the shorted capacitor terminals and the bare case the leakage current shall not exceed the following values:

<u>Nominal Capacitance</u>	<u>Voltage Rating</u>	<u>Max. Leakage Micro Amperes</u>
0-14 μ F	0-500	60
14.1-20 μ F	0-500	70
20.1 to 35 μ F	0-500	100
35.1 to 55 μ F	0-500	150
0 to 10 μ F	501-660	100

3.8.5 Room temperature life test — where a room temperature life test is required, it shall be identified by the letter "S". The test is described in Paragraph 22.

4. APPLICABLE DOCUMENTS

The latest revisions of the following standards when specified form part of this document.

- (a) E.I.A. Standard RS-186, Standard Test Methods for Electronics Component Parts.
- (b) Bulletin E.I.A. Source Code and Date Code.
- (c) NEMA Standard Publication DC2-1970 Residential Controls (Quick-Connect Terminals).
- (d) U. L. Standards UL1012, Power Supplies, and UL1029, HID Lamp Ballasts.

E.I.A. publications may be obtained from Electronic Industries Association, 2001 Eye Street, N.W., Washington, D.C. 20006.

NEMA publications may be obtained from National Electrical Manufacturers Association, 2101 L Street, Suite 300, Washington, D.C. 20037.

U. L. Standards may be obtained from Underwriters Laboratories, Inc., Publications Department, 207 East Ohio Street, Chicago, Illinois 60611.

5. STANDARD TEST CONDITIONS

- 5.1 Standard atmospheric conditions under which tests are to be conducted or referred to shall be as shown below unless otherwise specified.

Temperature: 20°C to 35°C (referred to 23°C $\pm$ 2°C values)
 Barometric Pressure: 28 to 32 inches (94 to 110 kilopascals)
 Relative Humidity: Less than 80%

- 5.2 Standard test frequency is at 60 Hz. Measurements at other frequencies shall be referred to 60 Hz.

6. QUALITY ASSURANCE

- 6.1 Recommended order of tests shall be as shown in Table 1. (See Page 7). No sample shall be subjected to more than one group of tests in Group 2, and Group 3 and Group 4.
- 6.2 Number of samples and allowable failures shall be as determined by agreement between the user and the supplier.