

**SPRAGUE**  
THE MARK OF RELIABILITY

a GK Technologies subsidiary

# Engineering Bulletin

**2410D**

Supersedes No. 2410C

## Type 127P

# FILMITE 'E' Capacitors in Hermetically Sealed Tubular Metal Cases

FILMITE 'E' capacitors employ a polyester film dielectric which achieves a combination of a wide operating temperature range (from  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$ ) and excellent electrical properties.

Positive hermetic closure of the metal cases is assured by glass-to-metal solder-seal terminals.

Electrically and mechanically, Type 127P capacitors meet stringent operating requirements.

### Outstanding Performance Characteristics

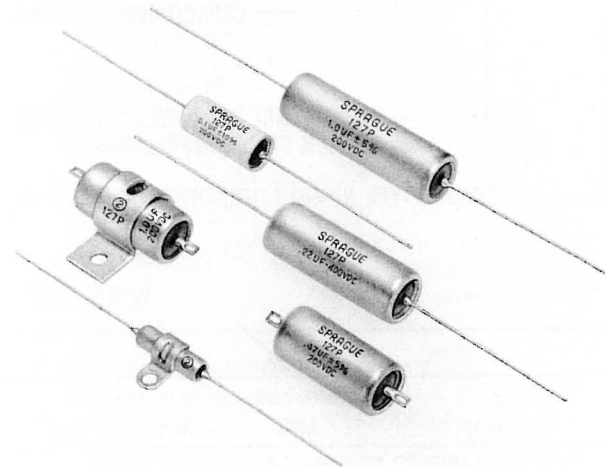
The product of insulation resistance and capacitance at room temperature is guaranteed to be in excess of 50,000 megohm-microfarads, approximately twice that of the best paper dielectric capacitors. Even at  $+150^{\circ}\text{C}$ , this product will be 10 megohm-microfarads or more.

Capacitance change with temperature is substantially flat from  $0^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$ . The dissipation factor of Type 127P capacitors, typically, will not exceed 1.5% over the entire operating temperature range, and it falls as low as 0.2% at  $+60^{\circ}\text{C}$ .

All Type 127P Filmite 'E' capacitors are of extended foil construction providing positive electrical contact between leads and electrodes regardless of the voltage level at which the capacitors may be operated. This construction of course, provides low series inductance.

### Standard Features Aid Designers

Type 127P capacitors are available with a number of case styles, terminals and capacitance tolerances. Thermoplastic or fiberglass insulating sleeves, or an attached mounting strap are standard options. Tab terminals may be specified in place of conventional



9536

wire leads. Standard capacitance tolerances available are  $\pm 20\%$ , and  $\pm 10\%$ . Useful capacitance values outside the EIA standard decade ratings are included in Type 127P 100 volt standard ratings.

### MIL Styles Available

Type 127P capacitors are industrial versions of MIL Styles CQR29, CQR32 and CQR33 capacitors manufactured to the requirements of Military Specification MIL-C-19978. For specific information on these MIL Style units, see the latest issue of Sprague Engineering Bulletin No. 2410.7.

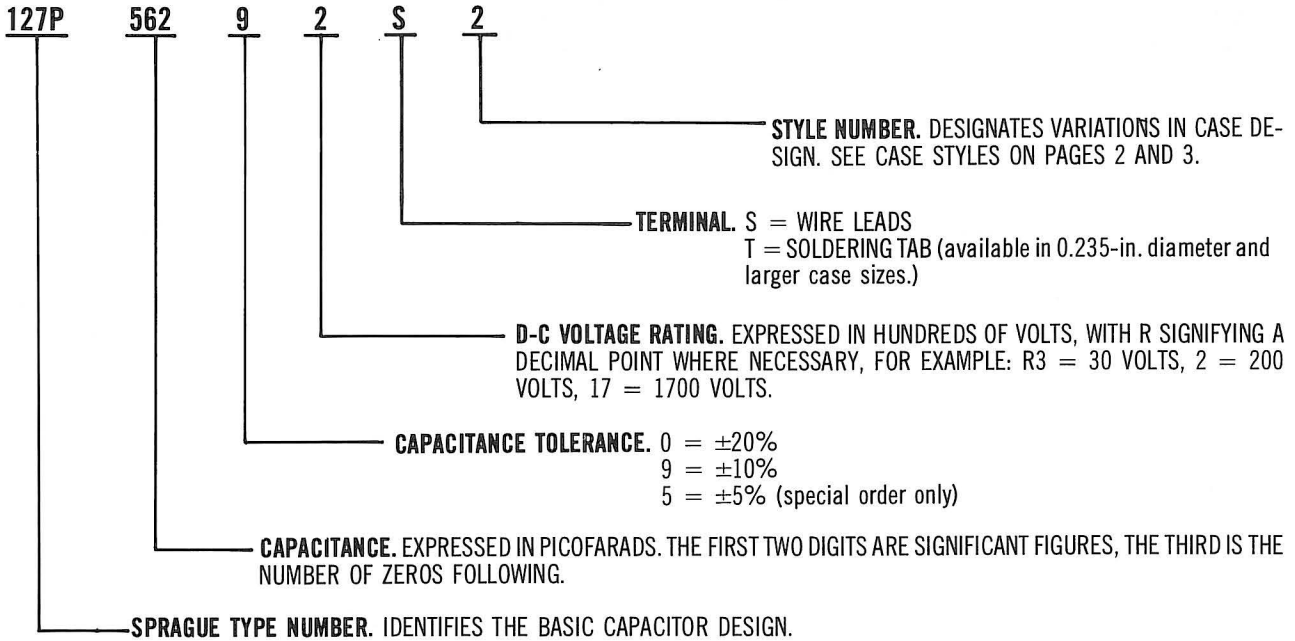
For additional information or applications engineering assistance, consult the Film and Paper Capacitor Marketing Section, Sprague Electric Company, North Adams, Mass. 01247.

**SPRAGUE ELECTRIC COMPANY**

**SPRAGUE**  
ENGINEERING  
BULLETIN  
**2410D**

# Catalog Numbering System

**ALWAYS SPECIFY BY COMPLETE CATALOG NUMBER, SUCH AS:**

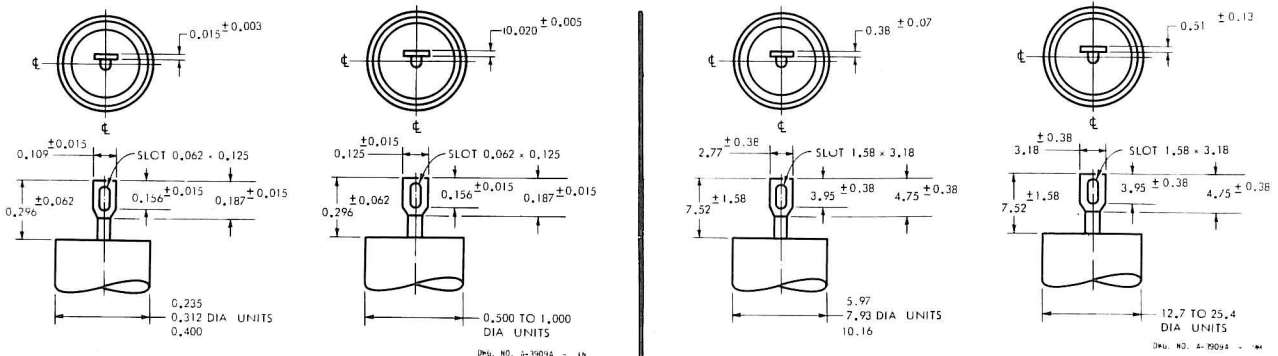


## WIRE LEAD DIMENSIONS\*

Inches			Millimetres		
Case Diameter	Wire Size AWG	Nom. Wire Diam.	Case Diameter	Wire Size AWG	Nom. Wire Diam.
0.175 to 0.195	No. 24	0.020	4.45 to 4.95	No. 24	0.51
0.235 to 0.312	No. 22	0.025	5.97 to 7.92	No. 22	0.64
0.400 up	No. 20	0.032	10.16 up	No. 20	0.81

\*No. 24 to No. 20 AWG wire leads are solder-coated copper-clad steel wire.

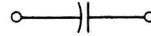
## TYPICAL TAB TERMINAL DIMENSIONS



# CASE STYLES

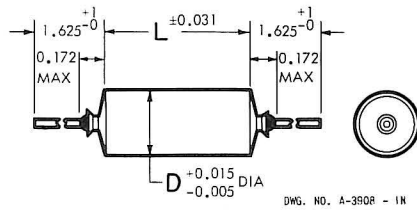
## Section Insulated from Case

DIMENSIONS IN INCHES



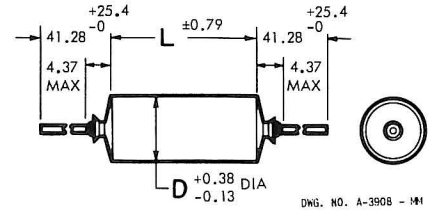
DIMENSIONS IN MILLIMETRES

**Style 2**  
Bare Case



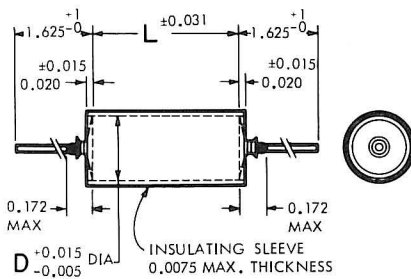
DWG. NO. A-3908 - 1N

**Style 2**  
Bare Case



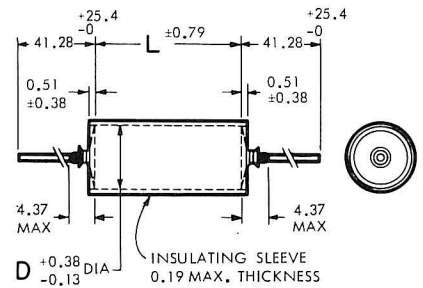
DWG. NO. A-3908 - 1M

**Style 4**  
With Polyester Insulating Sleeve  
Recommended for applications to +125°C.



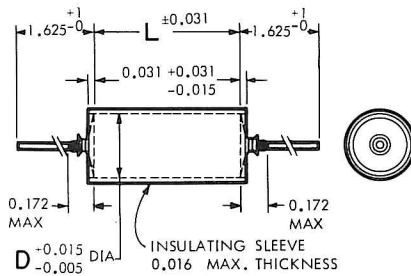
DWG. NO. A-3910 - 1N

**Style 4**  
With Polyester Insulating Sleeve  
Recommended for applications to +125°C.



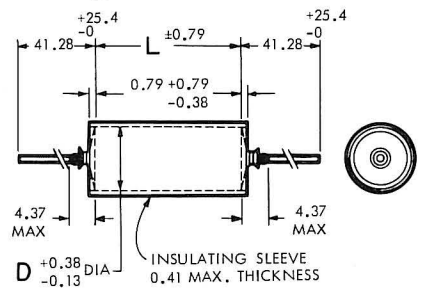
DWG. NO. A-3910 - 1M

**Style G4**  
With Fiberglass Insulating Sleeve  
Recommended for applications to +150°C



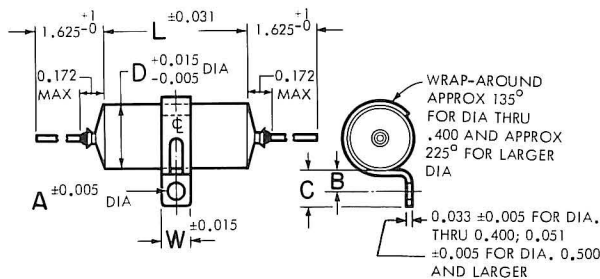
DWG. NO. A-3911 - 1N

**Style G4**  
With Fiberglass Insulating Sleeve  
Recommended for applications to +150°C



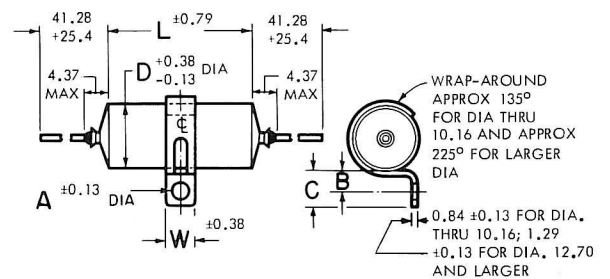
DWG. NO. A-3911 - 1M

**Style 13**  
Bare Case With Mounting Bracket  
Bracket located ±0.031" of center line.



DWG. NO. A-3915A - 1N

**Style 13**  
Bare Case With Mounting Bracket  
Bracket located 7.87 mm of center line.



DWG. NO. A3915A - 1M

D	Brackets	W	A	B	C
To 0.400	W1	0.250	0.144	0.187 ±0.015	0.312 ±0.031
0.500 up	W2	0.500	0.156	0.250 ±0.031	0.437 ±0.062

D	Brackets	W	A	B	C
To 10.16	W1	6.35	3.66	4.75 ±0.381	7.92 ±0.787
12.70 up	W2	12.70	3.96	6.35 ±0.787	11.1 ±1.58

## STANDARD RATINGS

$\mu\text{F}$	Size In.		Size mm		Catalog Numbers*		$\mu\text{F}$
	D	L	D	L	Cap. Tol. $\pm 20\%$	Cap. Tol. $\pm 10\%$	
<b>30 VOLTS D-C WORKING</b>							
1.5	.562	1.625	14.3	41.3	127P1550R3S2	127P1559R3S2	1.5
1.8	.670	1.875	17.0	47.6	—	127P1859R3S2	1.8
2.2	.670	1.875	17.0	47.6	127P2250R3S2	127P2259R3S2	2.2
2.7	.750	1.875	19.0	47.6	—	127P2759R3S2	2.7
3.3	.750	1.875	19.0	47.6	127P3350R3S2	127P3359R3S2	3.3
3.9	.750	2.625	19.0	66.7	—	127P3959R3S2	3.9
4.7	.750	2.625	19.0	66.7	127P4750R3S2	127P4759R3S2	4.7
5.6	1.000	2.125	25.4	54.0	—	127P5659R3S2	5.6
6.8	1.000	2.125	25.4	54.0	127P6850R3S2	127P6859R3S2	6.8
8.2	1.000	2.375	25.4	60.3	—	127P8259R3S2	8.2
10.0	1.000	2.375	25.4	60.3	127P1060R3S2	127P1069R3S2	10.0
<b>50 VOLTS D-C WORKING</b>							
.0056	.175	.750	4.45	19.0	—	127P5629R5S2	.0056
.0068	.175	.750	4.45	19.0	127P6820R5S2	127P6829R5S2	.0068
.0082	.175	.750	4.45	19.0	—	127P8229R5S2	.0082
.01	.175	.750	4.45	19.0	127P1030R5S2	127P1039R5S2	.01
.012	.175	.750	4.45	19.0	—	127P1239R5S2	.012
.015	.175	.750	4.45	19.0	127P1530R5S2	127P1539R5S2	.015
.018	.195	.750	4.95	19.0	—	127P1839R5S2	.018
.022	.195	.750	4.95	19.0	127P2230R5S2	127P2239R5S2	.022
.027	.195	.750	4.95	19.0	—	127P2739R5S2	.027
.033	.195	.750	4.95	19.0	127P3330R5S2	127P3339R5S2	.033
.039	.235	.750	5.97	19.0	—	127P3939R5S2	.039
.047	.235	.750	5.97	19.05	127P4730R5S2	127P4739R5S2	.047
.056	.312	.875	7.92	22.22	—	127P5639R5S2	.056
.068	.312	.875	7.92	22.22	127P6830R5S2	127P6839R5S2	.068
.082	.312	.875	7.92	22.22	—	127P8239R5S2	.082
.1	.312	.875	7.92	22.22	127P1040R5S2	127P1049R5S2	.1
.12	.312	.875	7.92	22.22	—	127P1249R5S2	.12
.15	.312	.875	7.92	22.22	127P1540R5S2	127P1549R5S2	.15
.18	.400	.875	10.16	22.22	—	127P1849R5S2	.18
.22	.400	.875	10.16	22.22	127P2240R5S2	127P2249R5S2	.22
.27	.400	.875	10.16	22.22	—	127P2749R5S2	.27
.33	.400	.875	10.16	22.22	127P3340R5S2	127P3349R5S2	.33
.39	.400	1.125	10.16	28.58	—	127P3949R5S2	.39
.47	.400	1.125	10.16	28.58	127P4740R5S2	127P4749R5S2	.47
.56	.400	1.375	10.16	34.92	—	127P5649R5S2	.56
.68	.400	1.375	10.16	34.92	127P6840R5S2	127P6849R5S2	.68
.82	.562	1.125	14.27	28.58	—	127P8249R5S2	.82
1.0	.562	1.125	14.27	28.58	127P1050R5S2	127P1059R5S2	1.0
<b>100 VOLTS D-C WORKING</b>							
.001	.175	.750	4.45	19.05	127P10201S2	127P10291S2	.001
.0012	.175	.750	4.45	19.05	—	127P12291S2	.0012
.0015	.175	.750	4.45	19.05	127P15201S2	127P15291S2	.0015
.0018	.175	.750	4.45	19.05	—	127P18291S2	.0018
.0022	.175	.750	4.45	19.05	127P22201S2	127P22291S2	.0022
.0027	.175	.750	4.45	19.05	—	127P27291S2	.0027

\*Catalog Numbers for Style 2 units with wire leads. For tab terminals change the 'S' to 'T'. For other case styles change the last character of the catalog number to the appropriate Style number (See Page 2).

**STANDARD RATINGS — Continued**

$\mu\text{F}$	Size In.		Size mm		Catalog Numbers*		$\mu\text{F}$
	D	L	D	L	Cap. Tol. $\pm 20\%$	Cap. Tol. $\pm 10\%$	
<b>100 VOLTS D-C WORKING — Continued</b>							
.0033	.175	.750	4.45	19.05	127P33201S2	127P33291S2	.0033
.0039	.175	.750	4.45	19.05	—	127P39291S2	.0039
.0047	.175	.750	4.45	19.05	127P47201S2	127P47291S2	.0047
.0056	.195	.750	4.95	19.05	—	127P56291S2	.0056
.0068	.195	.750	4.95	19.05	127P68201S2	127P68291S2	.0068
.0082	.235	.750	5.97	19.05	—	127P82291S2	.0082
.01	.235	.750	5.97	19.05	127P10301S2	127P10391S2	.01
.012	.235	.750	5.97	19.05	—	127P12391S2	.012
.015	.235	.750	5.97	19.05	127P15301S2	127P15391S2	.015
.018	.235	.750	5.97	19.05	—	127P18391S2	.018
.022	.235	.750	5.97	19.05	127P22301S2	127P22391S2	.022
.027	.312	.875	7.92	22.22	—	127P27391S2	.027
.033	.312	.875	7.92	22.22	127P33301S2	127P33391S2	.033
.039	.312	.875	7.92	22.22	—	127P39391S2	.039
.047	.312	.875	7.92	22.22	127P47301S2	127P47391S2	.047
.056	.312	.875	7.92	22.22	—	127P56391S2	.056
.068	.312	.875	7.92	22.22	127P68301S2	127P68391S2	.068
.082	.400	.875	10.16	22.22	—	127P82391S2	.082
.1	.400	.875	10.16	22.22	127P10401S2	127P10491S2	.1
.12	.400	.875	10.16	22.22	—	127P12491S2	.12
.15	.400	.875	10.16	22.22	127P15401S2	127P15491S2	.15
.18	.400	1.125	10.16	28.58	—	127P18491S2	.18
.22	.400	1.125	10.16	28.58	127P22401S2	127P22491S2	.22
.27	.400	1.375	10.16	34.92	—	127P27491S2	.27
.33	.400	1.375	10.16	34.92	127P33401S2	127P33491S2	.33
.39	.562	1.125	14.27	28.58	—	127P39491S2	.39
.47	.562	1.125	14.27	28.58	127P47401S2	127P47491S2	.47
.56	.562	1.375	14.27	34.92	—	127P56491S2	.56
.68	.562	1.375	14.27	34.92	127P68401S2	127P68491S2	.68
.82	.562	1.875	14.27	47.62	—	127P82491S2	.82
1.0	.562	1.875	14.27	47.62	127P10501S2	127P10591S2	1.0
1.2	.670	1.625	17.02	41.27	—	127P12591S2	1.2
1.5	.670	1.625	17.02	41.27	127P15501S2	127P15591S2	1.5
1.8	.670	1.875	17.02	47.62	—	127P18591S2	1.8
2.0	.670	1.875	17.02	47.62	127P20501S2	127P20591S2	2.0
2.2	.750	1.875	19.05	47.62	127P22501S2	127P22591S2	2.2
2.5	.750	1.875	19.05	47.62	127P25501S2	127P25591S2	2.5
2.7	.750	2.125	19.05	53.97	—	127P27591S2	2.7
3.0	.750	2.125	19.05	53.97	127P30501S2	127P30591S2	3.0
3.3	.750	2.375	19.05	60.32	127P33501S2	127P33591S2	3.3
3.5	.750	2.375	19.05	60.32	127P35501S2	127P35591S2	3.5
3.9	.750	2.625	19.05	66.67	—	127P39591S2	3.9
4.0	.750	2.625	19.05	66.67	127P40501S2	127P40591S2	4.0
4.7	1.000	2.625	25.4	66.67	127P47501S2	127P47591S2	4.7
5.0	1.000	1.875	25.4	47.62	127P50501S2	127P50591S2	5.0
5.6	1.000	2.125	25.4	53.97	—	127P56591S2	5.6

\*Catalog Numbers for Style 2 units with wire leads. For tab terminals change the 'S' to 'T'. For other case styles change the last character of the catalog number to the appropriate Style number (See Page 2).

**STANDARD RATINGS — Continued**

μF	Size In.		Size mm		Catalog Numbers*		μF
	D	L	D	L	Cap. Tol. ±20%	Cap. Tol. ±10%	
<b>100 VOLTS D-C WORKING — Continued</b>							
6.0	1.000	2.125	25.4	53.97	127P60501S2	127P60591S2	6.0
6.5	1.000	2.375	25.4	60.32	127P65501S2	127P65591S2	6.5
6.8	1.000	2.625	25.4	66.67	127P68501S2	127P68591S2	6.8
7.5	1.000	2.625	25.4	66.67	127P75501S2	127P75591S2	7.5
<b>200 VOLTS D-C WORKING</b>							
.0056	.235	.750	5.97	19.05	—	127P56292S2	.0056
.0068	.235	.750	5.97	19.05	127P68202S2	127P68292S2	.0068
.0082	.235	.750	5.97	19.05	—	127P82292S2	.0082
.01	.235	.750	5.97	19.05	127P10302S2	127P10392S2	.01
.012	.235	.750	5.97	19.05	—	127P12392S2	.012
.015	.235	.750	5.97	19.05	127P15302S2	127P15392S2	.015
.018	.235	.750	5.97	19.05	—	127P18392S2	.018
.022	.235	.750	5.97	19.05	127P22302S2	127P22392S2	.022
.027	.312	.875	7.92	22.22	—	127P27392S2	.027
.033	.312	.875	7.92	22.22	127P33302S2	127P33392S2	.033
.039	.312	.875	7.92	22.22	—	127P39392S2	.039
.047	.312	.875	7.92	22.22	127P47302S2	127P47392S2	.047
.056	.312	.875	7.92	22.22	—	127P56392S2	.056
.068	.312	.875	7.92	22.22	127P68302S2	127P68392S2	.068
.082	.400	.875	10.16	22.22	—	127P82392S2	.082
.1	.400	.875	10.16	22.22	127P10402S2	127P10492S2	.1
.12	.400	.875	10.16	22.22	—	127P12492S2	.12
.15	.400	.875	10.16	22.22	127P15402S2	127P15492S2	.15
.18	.400	1.125	10.16	28.58	—	127P18492S2	.18
.22	.400	1.125	10.16	28.58	127P22402S2	127P22492S2	.22
.27	.400	1.375	10.16	34.92	—	127P27492S2	.27
.33	.400	1.375	10.16	34.92	127P33402S2	127P33492S2	.33
.39	.562	1.125	14.27	28.58	—	127P39492S2	.39
.47	.562	1.125	14.27	28.58	127P47402S2	127P47492S2	.47
.56	.562	1.375	14.27	34.92	—	127P56492S2	.56
.68	.562	1.375	14.27	34.92	127P68402S2	127P68492S2	.68
.82	.562	1.875	14.27	47.62	—	127P82492S2	.82
1.0	.562	1.875	14.27	47.62	127P10502S2	127P10592S2	1.0
<b>400 VOLTS D-C WORKING</b>							
.0027	.235	.750	5.97	19.05	—	127P27294S2	.0027
.0033	.235	.750	5.97	19.05	127P33204S2	127P33294S2	.0033
.0039	.235	.750	5.97	19.05	—	127P39294S2	.0039
.0047	.235	.750	5.97	19.05	127P47204S2	127P47294S2	.0047
.0056	.235	.750	5.97	19.05	—	127P56294S2	.0056
.0068	.235	.750	5.97	19.05	127P68204S2	127P68294S2	.0068
.0082	.312	.875	7.92	22.22	—	127P82294S2	.0082
.01	.312	.875	7.92	22.22	127P10304S2	127P10394S2	.01
.012	.312	.875	7.92	22.22	—	127P12394S2	.012
.015	.312	.875	7.92	22.22	127P15304S2	127P15394S2	.015
.018	.312	1.000	7.92	25.4	—	127P18394S2	.018
.022	.312	1.000	7.92	25.4	127P22304S2	127P22394S2	.022
.027	.400	.875	10.16	22.22	—	127P27394S2	.027

\*Catalog Numbers for Style 2 units with wire leads. For tab terminals change the 'S' to 'T'. For other case styles change the last character of the catalog number to the appropriate Style number (See Page 2).

**STANDARD RATINGS — Continued**

μF	Size In.		Size mm		Catalog Numbers*		μF
	D	L	D	L	Cap. Tol. ±20%	Cap. Tol. ±10%	
<b>400 VOLTS D-C WORKING — Continued</b>							
.033	.400	.875	10.16	22.22	127P33304S2	127P33394S2	.033
.039	.400	1.000	10.16	25.4	—	127P39394S2	.039
.047	.400	1.000	10.16	25.4	127P47304S2	127P47394S2	.047
.056	.400	1.250	10.16	31.75	—	127P56394S2	.056
.068	.400	1.250	10.16	31.75	127P68304S2	127P68394S2	.068
.082	.400	1.500	10.16	38.1	—	127P82394S2	.082
.1	.400	1.500	10.16	38.1	127P10404S2	127P10494S2	.1
.12	.562	1.125	14.27	28.58	—	127P12494S2	.12
.15	.562	1.125	14.27	28.58	127P15404S2	127P15494S2	.15
.18	.562	1.500	14.27	38.1	—	127P18494S2	.18
.22	.562	1.500	14.27	38.1	127P22404S2	127P22494S2	.22
.27	.562	1.875	14.27	47.62	—	127P27494S2	.27
.33	.562	1.875	14.27	47.62	127P33404S2	127P33494S2	.33
.39	.670	1.875	17.02	47.62	—	127P39494S2	.39
.47	.670	1.875	17.02	47.62	127P47404S2	127P47494S2	.47
.56	.750	2.125	19.05	53.97	—	127P56494S2	.56
.68	.750	2.125	19.05	53.97	127P68404S2	127P68494S2	.68
.82	.750	2.625	19.05	66.67	—	127P82494S2	.82
1.0	.750	2.625	19.05	66.67	127P10504S2	127P10594S2	1.0
<b>600 VOLTS D-C WORKING</b>							
.001	.235	.750	5.97	19.05	127P10206S2	127P10296S2	.001
.0012	.235	.750	5.97	19.05	—	127P12296S2	.0012
.0015	.235	.750	5.97	19.05	127P15206S2	127P15296S2	.0015
.0018	.235	.750	5.97	19.05	—	127P18296S2	.0018
.0022	.235	.750	5.97	19.05	127P22206S2	127P22296S2	.0022
.0027	.235	.750	5.97	19.05	—	127P27296S2	.0027
.0033	.235	.750	5.97	19.05	127P33206S2	127P33296S2	.0033
.0039	.312	.875	7.92	22.22	—	127P39296S2	.0039
.0047	.312	.875	7.92	22.22	127P47206S2	127P47296S2	.0047
.0056	.312	.875	7.92	22.22	—	127P56296S2	.0056
.0068	.312	.875	7.92	22.22	127P68206S2	127P68296S2	.0068
.0082	.312	1.000	7.92	25.4	—	127P82296S2	.0082
.01	.312	1.000	7.92	25.4	127P10306S2	127P10396S2	.01
.012	.400	.875	10.16	22.22	—	127P12396S2	.012
.015	.400	.875	10.16	22.22	127P15306S2	127P15396S2	.015
.018	.400	1.000	10.16	25.4	—	127P18396S2	.018
.022	.400	1.000	10.16	25.4	127P22306S2	127P22396S2	.022
.027	.400	1.250	10.16	31.75	—	127P27396S2	.027
.033	.400	1.250	10.16	31.75	127P33306S2	127P33396S2	.033
.039	.400	1.500	10.16	38.1	—	127P39396S2	.039
.047	.400	1.500	10.16	38.1	127P47306S2	127P47396S2	.047
.056	.562	1.125	14.27	28.58	—	127P56396S2	.056
.068	.562	1.125	14.27	28.58	127P68306S2	127P68396S2	.068
.082	.562	1.375	14.27	34.92	—	127P82396S2	.082
.1	.562	1.375	14.27	34.92	127P10406S2	127P10496S2	.1
.12	.562	1.875	14.27	47.62	—	127P12496S2	.12
.15	.562	1.875	14.27	47.62	127P15406S2	127P15496S2	.15
.18	.670	1.875	17.02	47.62	—	127P18496S2	.18

\*Catalog numbers for Style 2 units with wire leads. For tab terminals change the 'S' to 'T'. For other case styles change the last character of the catalog number to the appropriate Style number (See Page 2).

**STANDARD RATINGS — Continued**

μF	Size In.		Size mm		Catalog Numbers*		μF
	D	L	D	L	Cap. Tol. ±20%	Cap. Tol. ±10%	
<b>600 VOLTS D-C WORKING — Continued</b>							
.22	.670	1.875	17.02	47.62	127P22406S2	127P22496S2	.22
.27	.750	2.125	19.05	53.97	—	127P27496S2	.27
.33	.750	2.125	19.05	53.97	127P33406S2	127P33496S2	.33
.39	.750	2.625	19.05	66.67	—	127P39496S2	.39
.47	.750	2.625	19.05	66.67	127P47406S2	127P47496S2	.47
.56	1.000	2.125	25.4	53.97	—	127P56496S2	.56
.68	1.000	2.125	25.4	53.97	127P68406S2	127P68496S2	.68
<b>1000 VOLTS D-C WORKING</b>							
.001	.312	.875	7.92	22.22	127P102010S2	127P102910S2	.001
.0012	.312	.875	7.92	22.22	—	127P122910S2	.0012
.0015	.312	.875	7.92	22.22	127P152010S2	127P152910S2	.0015
.0018	.312	.875	7.92	22.22	—	127P182910S2	.0018
.0022	.312	.875	7.92	22.22	127P222010S2	127P222910S2	.0022
.0027	.312	.875	7.92	22.22	—	127P272910S2	.0027
.0033	.312	.875	7.92	22.22	127P332010S2	127P332910S2	.0033
.0039	.400	.875	10.16	22.22	—	127P392910S2	.0039
.0047	.400	.875	10.16	22.22	127P472010S2	127P472910S2	.0047
.0056	.400	1.000	10.16	25.4	—	127P562910S2	.0056
.0068	.400	1.000	10.16	25.4	127P682010S2	127P682910S2	.0068
.0082	.400	1.250	10.16	31.75	—	127P822910S2	.0082
.01	.400	1.250	10.16	31.75	127P103010S2	127P103910S2	.01
.012	.400	1.500	10.16	38.1	—	127P123910S2	.012
.015	.400	1.500	10.16	38.1	127P153010S2	127P153910S2	.015
.018	.562	1.250	14.27	31.75	—	127P183910S2	.018
.022	.562	1.250	14.27	31.75	127P223010S2	127P223910S2	.022
.027	.562	1.500	14.27	38.1	—	127P273910S2	.027
.033	.562	1.500	14.27	38.1	127P333010S2	127P333910S2	.033
.039	.562	1.875	14.27	47.62	—	127P393910S2	.039
.047	.562	1.875	14.27	47.62	127P473010S2	127P473910S2	.047
.056	.670	1.875	17.02	47.62	—	127P563910S2	.056
.068	.670	1.875	17.02	47.62	127P683010S2	127P683910S2	.068
.082	.750	2.125	19.05	53.97	—	127P823910S2	.082
.1	.750	2.125	19.05	53.97	127P104010S2	127P104910S2	.1
.12	1.000	1.875	25.4	47.62	—	127P124910S2	.12
.15	1.000	1.875	25.4	47.62	127P154010S2	127P154910S2	.15
.18	1.000	2.375	25.4	60.32	—	127P184910S2	.18
.22	1.000	2.375	25.4	60.32	127P224010S2	127P224910S2	.22
<b>1700 VOLTS D-C WORKING</b>							
.001	.400	.875	10.16	22.22	127P102017S2	127P102917S2	.001
.0012	.400	.875	10.16	22.22	—	127P122917S2	.0012
.0015	.400	.875	10.16	22.22	127P152017S2	127P152917S2	.0015
.0018	.400	.875	10.16	22.22	—	127P182917S2	.0018
.0022	.400	.875	10.16	22.22	127P222017S2	127P222917S2	.0022
.0027	.400	1.000	10.16	25.4	—	127P272917S2	.0027
.0033	.400	1.000	10.16	25.4	127P332017S2	127P332917S2	.0033
.0039	.400	1.125	10.16	28.58	—	127P392917S2	.0039

\*Catalog numbers for Style 2 units with wire leads: For tab terminals change the 'S' to 'T'. For other case styles change the last character of the catalog number to the appropriate Style number (See Page 2).



**STANDARD RATINGS — Continued**

$\mu$ F	Size In.		Size mm		Catalog Numbers*		$\mu$ F
	D	L	D	L	Cap. Tol. $\pm$ 20%	Cap. Tol. $\pm$ 10%	
<b>1700 VOLTS D-C WORKING — Continued</b>							
.0047	.400	1.125	10.16	28.58	127P472017S2	127P472917S2	.0047
.0056	.400	1.375	10.16	34.92	—	127P562917S2	.0056
.0068	.400	1.375	10.16	34.92	127P682017S2	127P682917S2	.0068
.0082	.562	1.125	14.27	28.58	—	127P822917S2	.0082
.01	.562	1.125	14.27	28.58	127P103017S2	127P103917S2	.01
.012	.562	1.250	14.27	31.75	—	127P123917S2	.012
.015	.562	1.250	14.27	31.75	127P153017S2	127P153917S2	.015
.018	.562	1.625	14.27	41.27	—	127P183917S2	.018
.022	.562	1.625	14.27	41.27	127P223017S2	127P223917S2	.022
.027	.670	1.875	17.02	47.62	—	127P273917S2	.027
.033	.670	1.875	17.02	47.62	127P333017S2	127P333917S2	.033
.039	.750	1.875	19.05	47.62	—	127P393917S2	.039
.047	.750	1.875	19.05	47.62	127P473017S2	127P473917S2	.047
.056	.750	2.125	19.05	53.97	—	127P563917S2	.056
.068	.750	2.125	19.05	53.97	127P683017S2	127P683917S2	.068
.082	1.000	1.875	25.4	47.62	—	127P823917S2	.082
.1	1.000	1.875	25.4	47.62	127P104017S2	127P104917S2	.1
.12	1.000	2.375	25.4	60.32	—	127P124917S2	.12
.15	1.000	2.375	25.4	60.32	127P154017S2	127P154917S2	.15
<b>2500 VOLTS D-C WORKING</b>							
.001	.562	.875	14.27	22.22	127P102025S2	127P102925S2	.001
.0012	.562	.875	14.27	22.22	—	127P122925S2	.0012
.0015	.562	.875	14.27	22.22	127P152025S2	127P152925S2	.0015
.0018	.562	1.000	14.27	25.4	—	127P182925S2	.0018
.0022	.562	1.000	14.27	25.4	127P222025S2	127P222925S2	.0022
.0027	.562	1.125	14.27	28.58	—	127P272925S2	.0027
.0033	.562	1.125	14.27	28.58	127P332025S2	127P332925S2	.0033
.0039	.562	1.125	14.27	28.58	—	127P392925S2	.0039
.0047	.562	1.125	14.27	28.58	127P472025S2	127P472925S2	.0047
.0056	.562	1.375	14.27	34.92	—	127P562925S2	.0056
.0068	.562	1.375	14.27	34.92	127P682025S2	127P682925S2	.0068
.0082	.562	1.875	14.27	47.62	—	127P822925S2	.0082
.01	.562	1.875	14.27	47.62	127P103025S2	127P103925S2	.01
.012	.670	1.625	17.02	41.27	—	127P123925S2	.012
.015	.670	1.625	17.02	41.27	127P153025S2	127P153925S2	.015
.018	.750	1.875	19.05	47.62	—	127P183925S2	.018
.022	.750	1.875	19.05	47.62	127P223025S2	127P223925S2	.022
.027	.750	2.375	19.05	60.32	—	127P273925S2	.027
.033	.750	2.375	19.05	60.32	127P333025S2	127P333925S2	.033
.039	1.000	1.875	25.4	47.62	—	127P393925S2	.039
.047	1.000	1.875	25.4	47.62	127P473025S2	127P473925S2	.047
.056	1.000	2.625	25.4	66.67	—	127P563925S2	.056
.068	1.000	2.625	25.4	66.67	127P683025S2	127P683925S2	.068

\*Catalog Numbers for Style 2 units with wire leads. For tab terminals change the 'S' to 'T'. For other case styles change the last character of the catalog number to the appropriate Style number (See Page 2).

## PERFORMANCE CHARACTERISTICS

**1. Operating Temperature Range.** These capacitors are designed to operate over a temperature range of  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$ .

### 2. D-C Voltage Rating.

**2.1 At  $+85^{\circ}\text{C}$ .** The nominal voltage rating of these capacitors is based on operation at this temperature.

**2.2 At  $+105^{\circ}\text{C}$ .** The maximum permissible operating voltage is 66% of the  $+85^{\circ}\text{C}$  rating.

**2.3 At  $+125^{\circ}\text{C}$ .** The maximum permissible operating voltage is 50% of the  $+85^{\circ}\text{C}$  rating.

**2.4 At  $+150^{\circ}\text{C}$ .** The maximum permissible operating voltage is 30% of the  $+85^{\circ}\text{C}$  rating.

### 3. Insulation Resistance.

**3.1 At  $+25^{\circ}\text{C}$ .** The minimum product of insulation resistance, expressed in megohms, and capacitance, expressed in microfarads, shall be 50,000 megohm-microfarads.

**3.1.1** In no case, however, need the insulation resistance exceed 100,000 megohms.

**3.1.2** The insulation resistance between the case and either terminal shall be a minimum of 50,000 megohms.

**3.2 At  $+85^{\circ}\text{C}$ .** The minimum product of insulation resistance, expressed in megohms, and capacitance, expressed in microfarads, shall be 5,000 megohm-microfarads.

**3.2.1** In no case, however, need the insulation resistance exceed 50,000 megohms.

**3.3 At  $+105^{\circ}\text{C}$ .** The minimum product of insulation resistance, expressed in megohms, and capacitance, expressed in microfarads, shall be 500 megohm-microfarads.

**3.3.1** In no case, however, need the insulation resistance exceed 25,000 megohms.

**3.4 At  $+125^{\circ}\text{C}$ .** The minimum product of insulation resistance, expressed in megohms, and capacitance, expressed in microfarads, shall be 100 megohm-microfarads.

**3.4.1** In no case, however, need the insulation resistance exceed 5,000 megohms.

**3.5 At  $+150^{\circ}\text{C}$ .** The minimum product of insulation resistance, expressed in megohms, and capacitance, expressed in microfarads, shall be 10 megohm-microfarads.

**3.5.1** In no case, however, need the insulation resistance exceed 1,000 megohms.

**3.6** Measurements shall be made after a 2 minute charge at the rated voltage or 500 volts d-c, whichever is less.

### 4. Capacitance and Tolerance.

**4.1** The capacitance of all capacitors shall be within the specified tolerance limits of the nominal rating.

**4.1.1** Capacitors of  $1\ \mu\text{F}$  or less in capacitance value shall be measured at a frequency of 1000 Hz at a temperature of  $+25^{\circ}\text{C}$ , or else referred to measurements made at that frequency and temperature.

**4.1.2** Capacitors of greater than  $1\ \mu\text{F}$  in capacitance value shall be measured at a frequency of 60 Hz at a temperature of  $+25^{\circ}\text{C}$ , or else referred to measurements made at that frequency and temperature.

### 5. Dissipation Factor.

**5.1** The maximum dissipation factor of these capacitors shall be 0.6%.

**5.1.1** Capacitors of  $1\ \mu\text{F}$  or less in capacitance value shall be measured at a frequency of 1000 Hz at

**5.1.2** Capacitors of greater than  $1\ \mu\text{F}$  in capacitance value shall be measured at a frequency of 60 Hz at a temperature of  $+25^{\circ}\text{C}$ , or else referred to measurements made at that frequency and temperature.

### 6. Voltage Test.

**6.1** Capacitors shall withstand a d-c potential of 200% of the rated voltage applied between the terminals, for 2 minutes.

**6.2** Capacitors shall withstand a d-c potential of 200% of the rated voltage applied between the case and the terminals connected together, for 2 minutes.

**6.3** The test voltage shall be applied and discharged through a resistor of at least one ohm per volt.

## PERFORMANCE CHARACTERISTICS — Continued

### 7. Thermal Shock and Immersion Cycling.

7.1 The capacitance of all capacitors to be tested shall be measured as specified in Section 4.

7.2 Capacitors shall be subjected to a cycle of exposure to ambient air at a temperature of  $-65^{\circ}\text{C}$  ( $+0^{\circ}$ ,  $-5^{\circ}\text{C}$ ) for 30 minutes, then  $+25^{\circ}\text{C}$  ( $+10^{\circ}$ ,  $-5^{\circ}\text{C}$ ) for 5 minutes, then  $+125^{\circ}\text{C}$  ( $+3^{\circ}$ ,  $-0^{\circ}\text{C}$ ) for 30 minutes, then  $+25^{\circ}\text{C}$  ( $+10^{\circ}$ ,  $-5^{\circ}\text{C}$ ) for 5 minutes, for 5 cycles.

7.2.1 Capacitors shall show no visible damage.

7.3 Between 4 and 24 hours after temperature cycling, capacitors shall be subjected to a cycle of immersion in fresh tap water at a temperature of  $+65^{\circ}\text{C}$  ( $+5^{\circ}$ ,  $-0^{\circ}\text{C}$ ) for 15 minutes, then in a saturated solution of sodium chloride and water at a temperature of  $+25^{\circ}\text{C}$  ( $+10^{\circ}$ ,  $-5^{\circ}\text{C}$ ) for 15 minutes, for 2 cycles.

7.3.1 Capacitors shall be thoroughly rinsed and wiped or air-blasted dry immediately upon removal from immersion cycling.

7.4 Capacitors with insulating sleeves shall withstand a 4000 volt d-c potential applied between the case and a piece of metal foil placed around the insulating sleeve. The foil shall be of such dimension as to allow at least .125-inches (3.175 mm) exposure of the sleeve on each end.

7.4.1 All capacitors shall be subjected to voltage test as specified in Section 6.

7.4.2 Capacitors shall show no evidence of arcing, breakdown, harmful or extensive corrosion, obliteration of marking, or other visible damage.

7.5 The insulation resistance of all capacitors shall be measured as specified in Section 3.6, at a temperature of  $+25^{\circ}\text{C}$ .

7.5.1 The insulation resistance measured between terminals shall not be less than 60% of the value specified in Section 3.1.

7.5.2 The insulation resistance measured between the terminals and the case shall not be less than 50% of the value specified in Section 3.1.2.

7.5.3 Capacitors with insulating sleeves shall have the insulation resistance measured between the

case and a piece of metal foil placed around the insulating sleeve. The foil shall be of such dimension as to allow at least .125-inches (3.175 mm) exposure of the insulating sleeve on each end.

7.5.3.1 The insulation resistance measured between the case and the foil shall be at least 1000 megohms.

7.6 The capacitance change for all capacitors tested shall be less than 1% of the initial value measured as specified in Section 4.

7.7 The dissipation factor for all capacitors tested shall be less than 120% of the value specified in Section 5.

7.8 Not more than 1 failure is permitted in 25 units tested.

7.9 Capacitors subjected to thermal shock and immersion testing shall not be subjected to any other test.

### 8. Moisture Resistance Test.

8.1 The capacitance of all capacitors to be tested shall be measured as specified in Section 4.

8.2 Capacitors shall be conditioned at 50% relative humidity at a temperature of  $+50^{\circ} \pm 2^{\circ}\text{C}$  for 24 hours.

8.3 Thermal shock at 90% to 98% relative humidity with applied voltage shall be conducted in a test chamber constructed of non-reactive materials (non-resiniferous, and containing no formaldehyde or phenol). Steam or distilled, demineralized or deionized water having a pH value between 6.0 and 7.2 at  $23^{\circ}\text{C}$  shall be used to obtain the required humidity. No rust, corrosive contaminants or dripping condensate shall be imposed on test specimens.

8.3.1 Capacitors shall be mounted by their normal mounting means in a normal mounting position, and placed in the test chamber so that uniform and thorough exposure is obtained.

8.3.2 Capacitors shall be subjected to temperature cycling from  $+25^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$  to  $+25^{\circ}\text{C}$  ( $+10^{\circ}$ ,

## PERFORMANCE CHARACTERISTICS — Continued

–2°C) over a period of 8 hours at 90% to 98% relative humidity, for 20 cycles. A d-c potential of 100 volts or rated voltage, whichever is less, shall be applied to 50% of the capacitors during temperature cycling.

**8.3.3** Temperature cycling shall be stopped after an even number of cycles 5 times during the first 18 cycles and the capacitors shall be allowed to stabilize at high humidity for 1 to 4 hours.

**8.3.4** After stabilization, capacitors shall be removed from the humidity chamber and shall be conditioned for 3 hours at  $-10^{\circ}\pm 2^{\circ}\text{C}$ .

**8.3.5** After conditioning capacitors shall be subjected to vibration cycling consisting of a simple harmonic vibration having an amplitude of .03-inches (.76 mm) and a maximum total excursion of .06-inches (1.52 mm) varied uniformly from 10 Hz to 55 Hz to 10 Hz over a period of 1 minute, for 15 cycles.

**8.3.6** Capacitors shall then be returned to temperature/humidity cycling.

**8.4** After completion of temperature cycling, capacitors shall be conditioned at  $+25^{\circ}\pm 5^{\circ}\text{C}$  at 50% relative humidity, for 22 to 24 hours.

**8.5** Capacitors with insulating sleeves shall withstand a 4000 volt d-c potential applied between the case and a piece of metal foil placed around the insulating sleeve. The foil shall be of such dimension as to allow at least .125-inches (3.175 mm) exposure of the insulating sleeve on each end.

**8.5.1** All capacitors shall be subjected to voltage test as specified in Section 6.

**8.5.2** Capacitors shall show no evidence of arcing, breakdown, harmful or extensive corrosion, obliteration of marking, or other visible damage.

**8.6** The insulation resistance of all capacitors shall be measured as specified in Section 3.6, at a temperature of  $+25^{\circ}\text{C}$ .

**8.6.1** The insulation resistance measured between terminals shall not be less than 60% of the value specified in Section 3.1.

**8.6.2** The insulation resistance measured between the terminals and the case shall not be less than 50% of the value specified in Section 3.1.2.

**8.6.3** Capacitors with insulating sleeves shall have the insulation resistance measured between the case and a piece of metal foil placed around the insulating sleeve. The foil shall be of such dimension as to allow at least .125-inches (3.175 mm) exposure of the insulating sleeve on each end.

**8.6.3.1** The insulation resistance measured between the case and the foil shall be at least 1000 megohms.

**8.7** The capacitance change for all capacitors tested shall be less than 0.5% of the initial value measured as specified in Section 4.

**8.8** The dissipation factor for all capacitors tested shall be less than 120% of the value specified in Section 5.

**8.9** Not more than 1 failure is permitted in 25 units tested.

**8.10** Capacitors subjected to moisture resistance tests shall not be subjected to any other tests.

### 9. Life Test.

**9.1** These capacitors shall withstand a test potential of 140% of the rated voltage at  $+85^{\circ}\text{C}$  for 250 hours.

**9.2** A failure shall be considered to be any of the following:

**9.2.1** A permanent open or short circuit.

**9.2.2** A change in insulation resistance to less than 60% of the original requirements measured as specified in Section 3.

**9.2.3** A change in dissipation factor exceeding the original requirements measured as specified in Section 5.

**9.2.4** A change in capacitance measured as specified in Section 4 of more than 5%.

**9.2.5** A leakage of impregnant or deformation of the case.

## PERFORMANCE CHARACTERISTICS — Continued

9.3 Not more than 1 failure shall be permitted in 25 units tested.

10. **Lead Pull** — The capacitor shall be securely held by the body. A 5 pound (2.2 KG) force shall be gradually applied along the axis of the lead for a period of 1 minute.

11. **Lead Bend** — The capacitor shall be securely held by the body. A load of 2½ pounds (1.1 KG) shall be suspended from the lead at a point within ¼ (6.35 mm) inch from the free end. The capacitor shall be slowly inclined so as to bend the lead through 90° and then return it to normal position. The

load shall be restricted so that the lead bend starts  $\frac{3}{32}$  (2.38 mm)  $\pm \frac{1}{32}$  (0.79 mm) inch from the capacitor body. The rate of bend shall be approximately 3 seconds. A bend through 90° and return to normal position shall be considered 1 bend. Consecutive bends shall be in the same direction. The test consists of 3 complete bends.

12. **Marking.** Capacitors shall be marked with the name SPRAGUE and/or the Sprague trademark  $\text{\textcircled{S}}$ ; at vendor option, type or catalog number, capacitance, capacitance tolerance, and voltage. Capacitors with fiberglass insulating sleeves shall be marked on the insulating sleeve.

### 5% TOLERANCE UNITS AVAILABLE

For special circuit applications requiring very close tolerances on the nominal capacitance ratings,  $\pm 5\%$  units may be obtained. These can be made in any of the microfarad ratings in which 10% units are available, as well as in intermediate ratings falling between the regular 10% decade values.

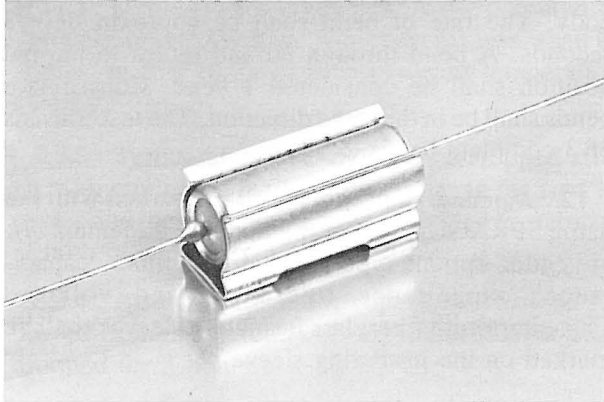
The entire list of standard 5% decade values can be constructed by using the following table. Each pair of two digits in this table represents the significant figures of the capacitance rating.

10	16	27	43	68
11	18	30	47	75
12	20	33	51	82
13	22	36	56	91
15	24	39	62	10

Five per cent units are available in the same range of capacitance and voltage ratings which are available for 10% and 20% units.

The first 5% value after a 20% decade value is available in the same size as the 20% unit. For the 10% decade value after a 20% value, the case size will be that of the next higher 20% value. For a 5% decade value preceding a 20% value, the case size will be that of the 20% value it precedes. Thus, a .91  $\mu\text{F}$ , 200 volt capacitor of a given type would be the same size as a 1.00  $\mu\text{F}$ , 200 volt capacitor. Likewise a .51  $\mu\text{F}$ , 200 volt capacitor of a given type would be the same size as a .47  $\mu\text{F}$ , 200 volt unit.

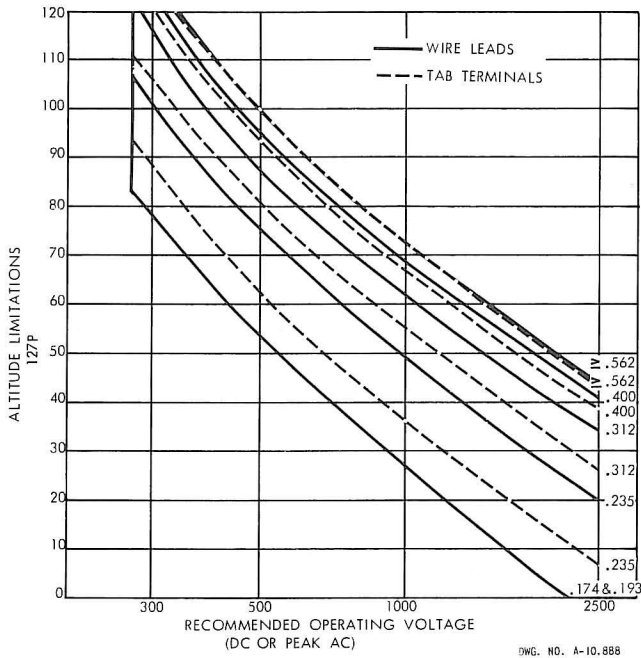
## Application Notes



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**1. Mounting.** Tubular capacitors should be mounted such that the leads are not required to withstand forces arising from the mass of the capacitor body where shock or high frequency vibration is likely to be encountered. The necessity for exercising great care in the use of a strap or clamp is emphasized. A clamp which pinches the body too tightly may injure it, either because of the stress produced in tightening or because of the aggravation of these stresses by vibration.

There are available, however, clamps designed to support capacitors subject to shock and vibration. Typical of these is the spring clip shown in the photograph at the left.



**2. Altitude Limitations.** Flashover across the compression glass-to-metal seals voltage limitations should be taken into consideration when designing circuits for use in guided missiles and similar high altitude applications. The curves below give the recommended operating voltages which should be taken into consideration when using these capacitors in electronic equipment. From the practical standpoint these curves indicate that it may sometimes be necessary to specify a higher working voltage capacitor in a larger diameter case in order to insure satisfactory operation of the finished equipment.

**3. Operating Life.** The curves shown below give the relationship between voltage, temperature, and the operating life which may be expected from these capacitors.

